Chicago Natural History Museum

BULLETIN

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NEW MURAL SHOWS PLANT LIFE OF COLOMBIA'S HIGH ANDES

BIZARRE AS A SCENE FROM ANOTHER WORLD IS THE 'PARAMO.' A PAINTING BY STAFF ARTIST ARTHUR G. RUECKERT (HALL 29)

By JOSÉ CUATRECASAS
CURATOR OF COLOMBIAN BOTANY

In Colombia, as in other tropical American countries, marked belts of vegetation correspond to altitudinal levels. Each of these belts is characterized by distinctive types of plant life found within its boundary. One of these ecological formations is the so-called "paramo," extending across northern South America from Venezuela to Colombia and southward to Peru and Bolivia.

The paramos occupy the most elevated regions of the Andes, where special climatic conditions prevail. Because of the sudden changes in weather, they are usually cold and wet, generally covered with fog or exposed to constant precipitation and strong winds. Such severe weather alternates with clear days of strong sunlight. The nights are always cold and in the highest parts (more than 13,000 feet above sea level) are frequently snowy. The ground usually is saturated with water; in large areas it is swampy, and interspersed with pools. The

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soil is black, peaty, and highly acid. Mostly it is very deep, except in the highest places, where the vegetation is sparse between the rocks and gravel.

The altitudinal limits of the paramo are not precise, since they vary greatly according to the topography, ranging from about 10,000 feet above sea level to 13,500–14,000 feet, the beginning of permanent snow. Located in the tropics, the normal climate of these high mountains presents a much greater contrast to that of the lower zones of the same mountain ranges than to that of the Alps, for example, since the lowest zones of the Andes, near sea level, have torrid temperatures.

A typical Colombian paramo with its extraordinary plant life can be seen in a new mural recently added to the series in Martin A. and Carrie Ryerson Hall (Hall 29 —Plant Life). The painting, by Staff Artist Arthur G. Rueckert, is based upon materials, photographs and data obtained by the writer over a period of years.

Actually this mural shows a scene from one of the most beautiful and least visited paramos of Colombia, namely, the western portion of the extreme southern part of the Sierra Nevada del Cocuy, also called Sierra Nevada de Chita. This sierra extends about eleven miles from north to south in the Cordillera Oriental in the state of Boyacá. The crests of the mountains consist of quartzite, are heavily covered by glaciers and snow, and attain a maximum elevation of 17,000 feet (Alto de Ritacuva). The highest point of the Nevada seen in the mural is the Pan de Azucar, at 15,600 feet, with a table-like structure to the north called Pulpito del Diablo (devil's pulpit). The tongue of the glacier lies at an altitude of approximately 14,100 feet. The rocky peak at the left is Los Guasguines and the peak at the right is Campanario. The valley represented is called Las Lagunillas. The moraine extending towards the north below the glacier forms the mountain called Silla Larga (13,500 feet), and the small lake at the base is the Laguna Pintada. This part of the scene shows the continental divide separating the waters reaching the Rio Magdalena on the west from those flowing into the Orinoco on the east (behind the scene).

SAME FAMILY AS SUNFLOWER

The presence in the landscape of plants of extraordinary appearance provides a spectacular effect, and of these the most conspicuous is the *frailejon*. The foreground, the bottom of the valley, shows the *frailejonal*, at an elevation of 12,000–12,600 feet, where this formation is at its best.

The name *frailejon* was given because of a fancied monk-like appearance of these plants, especially if seen in fog or mist, when from a distance they could be mistaken for men. The word *frailejonal* is a collective term for a group or formation of *frailejones*.

The *frailejones* belong to the Composite family, which includes such common plants as the sunflower, chrysanthemum, and aster. Within this great family of such diversity in form and color, no plants are perhaps so striking in appearance as the *frailejon*. Technically it belongs to the genus *Espeletia*, a name given by the scientist Mutis in honor of a viceroy of Colombia, José de Espeleta. The dominant species depicted in the mural which gives character to the entire scene, is *Espeletia Lopezii*, abounding especially in depressions and valleys of the slopes, and here shown in its various stages of development.

Aside from the characters which define *Espeletia* scientifically, the group is distinguished by having all the leaves bunched at the top of the stem to form a rosette. The stem may be short, in which case the rosette rests upon the ground; but often it is simple, straight, and pole-like, with the rosette at its tip. As the stem grows, new leaves appear and the old ones dry, but their persistent, densely overlapping sheaths cover and protect the stem—only in very old plants do these masses of dead leaves fall spontaneously. This produces the remarkable appearance characteristic of these plants—in a well-developed individual the lowest portion is the most slender part, a naked and woody stem; the middle portion is covered by the cylindrical mass; and in the upper portion below the rosette of normal leaves is a mass of dry and twisted leaves, giving it a thick club-shaped appearance.

LEAVES HAVE WOOLLY COAT

The leaves of *frailejon* are elliptic-oblong or lanceolate, long and narrow, thick and stiff. They are covered by a dense, white or pale coat of woolly or cottony hairs. The dense hairiness and faded color contribute to the unique appearance of the plants. Certain species of *Espeletia* (about seventy have been described) have a very short stem that does not elongate with age; these plants, like the young individuals of taller species, spread their large white rosettes over the ground like a cluster of agave leaves. When the *frailejones* bloom, the flower stalks arise from the axils of the living leaves. The inflorescences may be much longer than the leaves, but often they barely exceed them. Their branches are densely woolly and the declined or nodding flower heads are protected by hairy involucres. In full flower the similarity of the flower head to a small sunflower is evident. The rays are generally yellow, but in a few species white. The inflorescences consist of many heads, or in some species only of a few, and in some there is a single head.

Although the forms here described are the most general and typical of the *frailejones*, some species deviate from this type, but are not characteristic of paramo vegetation. The smallest *frailejones* are *E. Weddellii* of Venezuela and *E. Caldasii* of Colombia, with leaves one or two inches long, and usually with a single flower head nodding at the tip of a slender stalk. These are true herbaceous plants, like the other stemless species of this genus.

The species possessing stems are herbaceous in the beginning, but soon become woody. Their tall stems are woody, but retain a soft center (pith) and are hollow near the base. Although the *frailejones* are unbranched, there are some *Espeletias* with a branched stem, and one species found in forested areas (*E. neriifolia*) is a robust, much branched tree, as high as 35 feet. The average height of woody species of *Espeletia* is that represented in the mural, that is, from knee-high to two or three times the height of a man.

Some species have thick, leathery, grayish green leaves, while in others the hairy covering is smoother, appearing to be completely flattened and pressed, silky and of a silvery luster.

Locally the *frailejon* plants have certain uses. Their resin has been exploited in local industries. The leaves are used in the paramos to make beds, and the wool of the leaves is separated to stuff pillows and mattresses. The inhabitants of the region use it to plug their ears, as protection against cold, and employ the leaves for the same purpose, placing them inside their shirts or

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FUN AT THE MUSEUM— QUIZ YOURSELF

1. What is the difference between the scale on a mandolin and the scale on a pangolin?
2. Would you take a pair of Atlantic skates with you on a winter vacation?
3. Do tufted puffins come with icing or are they stuffed with fish?
4. Would you close an envelope, or a fruit jar, or neither, with a Weddell's seal?
5. Would you play a black drum with sticks or a fish-pole?
6. Is it true or false that stonecats never molest birds or cause a disturbance at night?
7. Where would you look for a squirrel glider? At an airport? A playground? Or in a forest in Australia?
8. What are the difficulties of arranging a bouquet of sea lilies in a Venus flower basket?
9. Would you look for a red hind with a lasso, a hook and line, or a shotgun?
10. Duckbills are toothless, have fur, lay eggs, and nurse their young. What are they?

For the answers, visit the Museum. To confirm what you find, watch for answers which will be published in the next issue of the BULLETIN.

—J. R. M.

hats, while the stems are used for shelters or small huts in the paramos.

ADAPTATION TO EXTREME CLIMATE

As a result of the extreme differences in climatic conditions prevailing between the lower zones and the paramos, adaptation of plants is more difficult—a disadvantage even for a rich flora—than in temperate zones. Moreover, in these paramos, the adaptation of northern plants is affected by a new ecological factor, namely, the "tropical" factor, a complex characterized by the absence of marked seasonal changes and the presence of strong daily changes. The plants of the paramos are especially equipped to resist the cold and to withstand a low water supply, resulting from hours of intense transpiration and reduced absorption caused by low temperature of the soil water and by high soil acidity. For this reason they exhibit adaptations to aridity. The shrubs are small or densely branched. Their leaves are leathery with revolute edges, needle-like and imbricated, or covered with hairs. The herbs have clustered basal leaves that form rosettes, or the plants are crowded as cushions, dense clumps, or compact turf.

'EDELWEISS OF TROPICS'

It is because of adaptation to these special conditions of cold and wind prevailing on the paramos that the *frailejones* have their leaves and inflorescences covered with a mat of woolly hairs and the stems enveloped by a coat of withered leaves. Some alpine plants of Europe are famous because of their peculiar forms and similar adaptations. The celebrated edelweiss, with heads protected by a rosette of spreading bracts, is entirely covered with a thick white woolen coat and is a good example of adaptation; it belongs to the same family (Compositae) as the *frailejon*. The latter might well be considered a giant relative of edelweiss in the Andes that rise high above but within the the tropics. Edelweiss, with its white elegance, adorns and characterizes the Alps; likewise, the stately stands of *frailejon* lend incomparable beauty and exotic majesty to the paramo landscape of Colombia.

4-H YOUTHS VISIT MUSEUM

Approximately 1,000 members of the National Congress of 4-H clubs—500 girls and 500 boys from rural areas all over the United States and Canada—visited the Museum early in December while in Chicago for the International Livestock Exposition.

THE ANCIENT MAYA ARTISTS AND ARCHITECTS OF MEXICO AND GUATEMALA

By DONALD COLLIER
CURATOR OF SOUTH AMERICAN ETHNOLOGY AND ARCHAEOLOGY

A recently installed exhibit in the Hall of American Archaeology (Hall B) deals with the art and architecture of the Maya Indians of Yucatan and the adjacent parts of Mexico and Guatemala. The Mayas developed a civilization with a complex religion and elaborate rituals, hieroglyphic writing, an accurate calendar, a rich and varied art, and monumental architecture. Maya culture lasted from about A.D. 300 until the 15th century, when there set in a cultural decline lasting until the Spanish conquest.

The Mayas were farmers whose staple crops were corn, squash, and beans. They also raised cacao, chili peppers, tomatoes, and cotton; and they kept domesticated bees.

Maya cities consisted of stone temples, often erected on stepped pyramids, and stone houses for the priests and nobles. The temples and other buildings were symmetrically arranged about great plazas, and the various groups of buildings were connected by paved avenues or stone causeways.

The common people, most of whom lived in simple thatched houses on farms in the country, gathered in the cities for ceremonies and festivals. Maya cities lacked the great populations and intensive commercial and manufacturing activities that are characteristic of modern cities. They were primarily seats of the ruling class and religious centers for the surrounding rural population.

Maya art was expressed in brightly painted buildings ornamented with sculpture in stone, stucco, and wood; in sculptured and painted murals; in beautifully carved and painted pottery vessels; and in ornaments carved from shell and jade.

Half of the new exhibit is devoted to displaying examples of Maya sculpture and plastic art. In the other half, cut-outs, rendered in full architectural detail, of typical buildings from the principal Maya cities are superimposed on a map of the Maya area. Flanking the map are four photo-murals showing actual Maya buildings and reconstructions of Maya cities.

The exhibit was designed by Mr. Gustav Dalstrom, artist in the Department of Anthropology, Dr. Alexander Spoehr, Curator of Oceanic Ethnology, and the writer. The negatives from which the photo-murals were made were lent by the Carnegie Institution of Washington.

NEW EXHIBIT IN HALL OF AMERICAN ARCHAEOLOGY ILLUSTRATING MAYA ARTS AND ARCHITECTURE

NOTES ON BIRDS OF THE PHILIPPINE EXPEDITION

By AUSTIN L. RAND
CURATOR OF BIRDS

THE UNKNOWN is fascinating, and its fascination is of a type not to be compared with that of the flame for the moth that results in singed wings and destruction. The view that the search for the unknown automatically destroys its fascination by its very success is superficial, for once an unknown becomes known, new vistas to further unknowns appear. The true investigator travels hopefully, never arriving. He should be among the happiest of mortals. And he often is.

The explorer discovers an unknown mountain in a far land. At once arise the questions: "How did it get there?" "What is its geological history?" "How is animal life affected by it?" "Are the animal inhabitants different on this mountain?" "Is the fauna related to that of other nearby mountains?" Where before there was one blanket question, "What is in this far land?", there now appear a host of more specific questions.

SCIENTIST'S PARADISE

Dr. Austin L. Rand, Curator of Birds, in his research laboratory surrounded by some of the bird rarities collected by the Museum's Zoological Expedition to the Philippines.

The thrill of discovery is usually associated with the traveler who sees a mountain, a hornbill, a kiwi, for the first time. It's a personal thrill of new experience, and its effects are heightened if there is reason to think that no one has seen it before. But perhaps a greater thrill comes to the research man who sorts out and studies the collections the traveler brings back. He is the man who judges what's new. And being new to him means new to the scientific world. Some specimens may be brilliant in color, and their patterns intricate in design. But unless they serve as material for adding to our knowledge the researcher quickly goes on to others, looking for something that will provide new knowledge.

Correlation of Knowledge

The new material may not be the first of its kind; it may be additional specimens that show the first was not a freak; the new data may give range of variation, habitat, and clues to relationship. After the first description—often from incomplete material—comes the more intensive work that correlates the new with the already known. First there is the description of the first discoveries and then the getting of data into a pattern. It is the latter process that shows up the gaps in the data.

Current studies on the birds of the Philippine Islands, based on the specimens brought to the Museum by the Philippine Expedition of 1946–47, are in this stage. The Philippine fauna has been the object of study since the early 18th century; the work of Worcester and Burns, Steere, Mearns, McGregor represented the pioneer stage summarized in 1908. In 1946, Delacour and Mayr brought out a new guide to the Philippine birds. But as Delacour and Mayr say in their introduction, their manual, like that of McGregor, is a guide to the gaps in our knowledge as well as to what we know. Thus the study of the Philippine fauna is now in the second and more critical stage.

The work of this Museum's Philippine expedition has already been outlined in general in earlier numbers of this BULLETIN. It spent a year in Luzon, Mindanao, and Palawan. The earlier reports spoke of the striking hornbills, the gaudy parrots, and the great monkey-eating eagle. But when the collections were unpacked in the bird room the monkey-eating eagle was brushed aside; it had been described, figured, and kept in captivity. True, true, it was a most unusual bird, a goshawk-like bird the size of a big eagle that feeds on monkeys, but there's a similar bird in New Guinea, *Harpyopsis*, that feeds on wallabies, and there is also the harpy eagle of South America.

The parrots were gaudy but typical of tropical forest, and well described, though if they were in good series they might provide material for a later study on inter-island variation; the megapodes, that put their eggs in the ground and leave them to hatch by themselves, are unusual, it's true, but hardly new. Alfred Russel Wallace in the last century left an egg on a table in his cabin and the megapode chick hatched and right away flew out the window. These, too, were brushed aside by the ornithologist. Striking, yes; once they were new and bizarre but not now.

The Ornithologist's Cinderella

Instead, the eyes of the ornithologist fastened on a dull brownish bird about the size of a hermit thrush. With a short rounded wing, few rictal bristles, and feet that indicated a forest floor habitat, it had to be *Leonardina woodi*, or new to science. But *Leonardina* was a monotypic genus, known to science by only a single specimen. When bird students meet and speak of Philippine Island birds they ask—"Have you found any trace of *Leonardina woodi*, the rarest Philippine bird?" The description checked, but in a case like this a direct comparison with the one known specimen is necessary. It was in the United States National Museum and when it was borrowed the new specimen matched feather for feather. There was no doubt it was the second specimen of *Leonardina woodi*.

The ornithologist's eyes were caught also by the series of green finches he knew as *Erythrura*. Some of them had bluish heads and were buffy below; they represented the Philippine green finch, rare enough but well known. But three other specimens had heads all green. There was only one species like that, *Erythrura viridifacies*, which was not named until 1937; and strange to relate, it had never before been taken in the wild by an ornithologist! The history of the species was unusual. A few, that appeared in the vicinity of Manila, where the cage bird industry thrived before 1936, were misidentified as the blue-headed New Guinea species and thought to be escaped cage birds.

In 1936–37 some hundreds of live birds of this species were shipped as aviary birds from Manila and expert ornithologists found they didn't know it. Delacour and Hachisuka named the species from cage birds, and speculated on its normal habits, thinking that perhaps it wandered like our crossbills; that perhaps it was a shy and secretive bird of swamps; and that possibly its regular

haunts were somewhere on Luzon. Now here were the first properly documented specimens, the only ones in existence, from Massisiat in northern Luzon, and the note "feeding in flocks of six to ten in bamboos" on the back of the label is still the only clue we have to its habits.

A small series of little birds next attracted the ornithologist's attention. They were sunbirds, mostly dull olive and grey. There were many more brilliant sunbirds in the tray, but that was just it. No known Philippine sunbirds were that dull in color. But they came from Mt. Apo, that strange isolated mountain in Mindanao, that harbors so many birds known from nowhere else. They were from the Philippines all right, and they had no name in the books and journals available in Chicago. But since in recent years the distribution of literature has been sadly interrupted, the ornithologist was not satisfied. So he wrote his colleagues in the East, who had just written a book on the Philippine birds, and asked them if they knew this little dull sunbird.

Sure enough, a description that had reached the library of the American Museum of Natural History in New York had been published in Japan in 1940. The describer had four specimens. We had three more. But then a curious thing came to light. The species had actually been described but not named in 1905 in Washington, but as the female of another species. So now these little sunbirds take their place in our classification as the dullest and most primitive of the sunbird genus *Aethopyga*, and we have three of the eight known specimens.

Variations Bring New Names

When the rarities were all picked out, there was still work of another kind to be done. The trogons of the Philippines are beautiful pink and brown birds. The ornithologist admired their beauty, and then laid out the fine series from Luzon and Mindanao. At once something was apparent that everyone else has missed; the northern birds had smaller bills and paler brown backs than the southern ones. A new name, or a name already in existence but "buried in synonymy" would have to be allocated so that the differences could be conveniently discussed.

The series of small yellow-bellied flower peckers from the Calamianes Islands were richer and more orange than the series from Palawan; a new name would have to be given them.

The series of brilliant gold and black orioles presented an amazing array of variation. From island to island there were differences when the series were considered as populations, but the importance of the differences could not be evaluated with present material only.

Such discoveries will all be incorporated into the next review of Philippine Island birds. The adequate description of a given fauna grows step by step; the collector brings back material; the new species are described; the researcher correlates the information bit by bit; and finally it is epitomized in a handbook, a stock taking of what we know and of where the big gaps in our knowledge lie. The focus shifts and again sharpens on the fascinating unknown.

SCIENTIFIC MEETINGS

A number of members of the Museum staff attended meetings of various learned societies both in Chicago and elsewhere in the last week of 1947, and several of them presented scientific papers. The meetings of many of the societies were held in connection with the 114th meeting of the American Association for the Advancement of Science which took place in Chicago, December 26 to 31.

At a joint session of the systematic section of the Botanical Society of America and the American Society of Plant Taxonomists, held in the James Simpson Theatre of the Museum as a part of the A.A.A.S. meetings, **Dr. Theodor K. Just**, Chief Curator of Botany, presented a report on nomenclature for paleobotanists; and at the joint sessions of the paleobotanical section with the Society for the Study of Evolution, Dr. Just presented a paper on "Gymnosperms and the Origin of Angiosperms." **Mr. Karl P. Schmidt**, Chief Curator of Zoology, participated in the meetings of the Society of Systematic Zoologists (A.A.A.S.). **Dr. Julian A. Steyermark**, Associate Curator of the Herbarium, presented a paper on "Flora of Guatemala" at a meeting of the Ecological Society of America; and another one, "Speciation in the Venezuelan Guyana," at a meeting of the systematic section of the Botanical Society of America with the American Society of Plant Taxonomists (A.A.A.S.). **Dr. Hugh Cutler**, Curator of Economic Botany, addressed the same meeting on "Species Relations In *Cucurbita*."

Dr. Paul S. Martin, Chief Curator of Anthropology, and **Mr. Donald Collier**, Curator of South American Ethnology and Archaeology, attended meetings in Albuquerque, New Mexico, of the American Anthropological Society, the Society for American Archaeology and the Society for Applied Anthropology. Dr. Martin presented a paper on the results of his 1947 expedition for this Museum to western New Mexico.

Dr. Sharat K. Roy, Chief Curator of Geology, and **Mr. Bryan Patterson**, Curator of Paleontology, attended the meetings in Ottawa, Canada of the Geological Society of America, and afterwards Dr. Roy visited the Arctic Institute of America in Montreal.

Museum lecture tours are entertaining, educational. See list, page 8.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

MARINER OF THE NORTH. By George Palmer Putnam. Duell, Sloan & Pearce, New York, 1947. 246 pages. Price $3.50.

Reviewed by Sharat K. Roy, Chief Curator of Geology.

In the annals of Arctic explorations, few have played a more rugged role, or written a more colorful chapter than Captain Bob Bartlett.

Mariner of the North is the story of this stout Newfoundland salt who gambled half a lifetime in the chaos of the polar sea where the elements, not the humans, make the final plans.

Born and reared in prosperity, amidst wooden ships and sudden blizzards, Bob Bartlett all but inherited his love for the sea and ice. As he grew, this love became his grand passion which showed no sign of wane to the day he died in New York City, April 28, 1946.

A steadfast bachelor, independent to a fault in spirit and action, he held no brief for either man or woman. There were two exceptions: one was his mother to whom he wrote a letter each day; the other, Admiral Robert E. Peary. He was the magnet who drew Bob Bartlett northward and launched him in the grim business of finding a way or making one. Peary was always right! "At the drop of a hat—with or without gold braid—he'd tell the world about his hero."

Bob Bartlett skippered the Peary Polar Expedition ship, the *Roosevelt*, and accompanied Peary on his successful dash to the Pole, to the edge of the eighty-eighth parallel. The top of the world was but one hundred and thirty miles away but Peary decided that Henson, his Negro valet, not Captain Bartlett, the skipper of his ship, would accompany him on the final lap. What rankled in Bob Bartlett's mind the world never knew, for he voiced no disappointment then or ever. On the contrary, he told Peary's critics, "Don't forget that Henson was a better dog-driver than I."

Five years later, Captain Bartlett commanded the brigantine *Karluk* on Stefansson's Canadian Arctic Expedition. "This will have the North Pole trip beaten to a frazzle," Bob Bartlett wrote to a friend. So it did. On the first leg of her journey to Herschel Island, *Karluk* became caught in the polar pack, and sank out of sight of land, off Wrangell Island. While *Karluk* was sinking, Captain Bartlett, for a brief few minutes, and to the consternation of all on board, re-enacted Nero. "With the vessel

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Members are requested to inform the Museum promptly of changes of address.

3 VETERAN EMPLOYEES OF MUSEUM RETIRE

December 31, 1947 marked the close of the Museum career of an old and trusted employee, Mr. Charles H. Carpenter, Chief of the Division of Photography. Mr. Carpenter joined the staff of the Museum in October, 1899, and is leaving the Museum, after forty-eight years of service, due to his advanced age. The retirement pension voted him by the Board of Trustees approximates his regular salary.

Mr. Carpenter was born in Granville, Ohio, October 20, 1859, and graduated from Denison University, located in the same town, in June, 1879. His services at the Museum were all in the Division of Photography and the vast collection of photographic negatives and prints in the possession of the Museum was accumulated almost entirely under his direction.

* * *

Mr. E. Stanley Abbey, Captain of the Guard of the Museum, also retired from its service December 31, 1947. He was born in Manchester, England, on August 4, 1868 and came to the United States in 1904.

In October, 1905, Mr. Abbey came to the Museum as a guard, and became head of the guard organization May 1, 1924. Besides his wide acquaintance among all staff members of the Museum he is also well-known to many Museum visitors. He has achieved a unique record for being present on duty throughout his career of more than forty years. During this entire period, he was absent on only one occasion, that being of short duration and resulting from the effects of acid fumes to which he was exposed in line of duty at the Museum.

* * *

Another faithful employee leaving the service of the Museum at the end of the year is Anthony T. Mazur, sheet metal worker. Mr. Mazur was born in Jaslo, Poland, on June 7, 1878 and came to the Museum in the summer of 1926. Impaired physical condition has prompted his retirement at this time.

The best wishes of the administration and their fellow workers go to these three veteran employees in their retirement.

CLIFFORD C. GREGG
Director

CHANGES IN MUSEUM BUSINESS OFFICE

Mr. William A. Bender, who joined the staff as Assistant Auditor on February 17, 1947, will become Auditor of the Museum on January 1, 1948. Prior to coming to the Museum, Mr. Bender served for many years in the business organization of Kroehler Manufacturing Company at Naperville, Illinois, where he makes his home.

Mr. Benjamin Bridge retires as Auditor and takes the position of Auditor Emeritus. Mr. Bridge joined the Museum Staff on February 17, 1897, and has served continuously almost fifty-one years. During his service, he has seen almost the complete growth of the institution from a small local institution to its present position as one of the great museums of the world. His years of service exceed those of any other individual and undoubtedly establish a record for all time to come.

STAFF APPOINTMENTS

Director Clifford C. Gregg has announced a number of staff promotions to be effective January 1, 1948. Dr. Julian A. Steyermark, Assistant Curator of the Herbarium, has been promoted to Associate Curator; Mr. Harry E. Changnon, Assistant Curator of Geology, has been appointed Curator of Exhibits in the Department of Geology; Dr. Robert Kriss Wyant, Assistant Curator of Economic Geology, has been promoted to Curator of Economic Geology; Mr. Herman Abendroth, Assistant Photographer, has been promoted to Chief Photographer; Mr. A. L. Stebbins, bookkeeper, has been appointed Assistant Auditor; Mr. Leonard Carrion, a member of the maintenance staff, has been appointed Assistant Chief Engineer, and Mr. David J. Conwill, Sergeant of the Guard, has been appointed Captain of the Guard filling the position left vacant by the retirement of Captain E. S. Abbey.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: Mrs. George A. Carpenter, Chicago —5 ethnological specimens, Alaska, Mexico, Bali, and Polynesia.

Department of Botany:

From: Dr. Walter Kiener, Lincoln, Neb.—949 herbarium specimens, Nebraska, and 89 specimens of algae, United States and Mexico; Vaughan's Seed Company, Chicago —310 packets of flower and vegetable seeds, and 2 catalogues; Lewis E. Long, Washington, D.C.—105 herbarium specimens and a collection of seeds, Nicaragua; Universidad Nacional, Medellín, Colombia—178 herbarium specimens, Colombia; Dr. Herbert Habeeb, Grand Falls, N. B.—154 specimens of algae, New Brunswick.

Department of Geology:

From: John E. Jones, Benton, Ill.—14 fossil plants, Illinois; C. M. Barber, Flint, Mich.—20 invertebrate fossils, Mississippi.

Department of Zoology:

From: Henry Van der Schalie, Ann Arbor, Mich.—35 specimens of fresh water clams, Kentucky; Chicago Zoological Society, Brookfield, Ill.—2 snakes, Austria, and a mammal; George M. Stevens, Marcella, Ark.—a cotton rat, Arkansas; H. Howorka, Wonder Lake, Ill.—a golden hamster; Harry Hoogstraal and S. G. Jewett, Jr., Chicago—28 various bird skins, Dutch New Guinea; Dr. Walter Biese, Santiago, Chile—16 specimens of land shells, Chile.

NEW MEMBERS

The following persons became Members of the Museum during the period from November 17 to December 15:

Associate Members

Mrs. John Coleman

Annual Members

Quentin H. Blewett, Jr., William V. Cook, William G. Dahl, Richard Norris Eiger, Mrs. Hugh M. Fogo, Dr. Edmund F. Foley, Mrs. Darius C. Franche, Sr., O. E. Frankenbush, Miss Helen H. Grove, E. V. Haserodt, Hymen I. Henner, Frank A. Hohenadel, Sidney G. Karras, Ralph W. Kolkmeyer, L. Martin Krautter, Mrs. Winfred L. Lovejoy, Donald S. Manchester, Miss Lilian Marchant, Dr. Louis M. Marks, Donald E. Nichols, Dr. Harry Nichols, Thomas J. Nyhan, Mrs. Mary M. Osanai, E. L. Ostrander, Max Schiff, Robert B. Schnering, Mrs. Max P. Schottenhamel, Dr. Walford A. Schwab, Edward R. Seaberg, George W. Smith, Herbert W. Stoetzel, Edward H. Wigdahl, Mrs. Edwin G. Wiley.

Owing to protection of the elephant by game laws, ivory is now little used by Negroes of Africa. But in Hall E, Case 39, are some excellent old examples of ivory armlets and anklets from north central areas of Africa.

IS MAGIC DEAD?

By WILFRID D. HAMBLY
CURATOR OF AFRICAN ETHNOLOGY

IS MAGIC dead? Or does it still work? I asked myself these questions when preparing for a long journey in West Africa as leader of the Frederick H. Rawson West African Expedition of the Museum. Can it be that in these modern days of radio, television, and aviation, witches still work their spells, converse with the dead, make rain, or cast out devils?

"Why not?" I thought. Have we not our spiritualists and mediums, our tellers of the future from tea leaves at a charge of seventy-five cents including the tea and cakes? We have all this and much more, especially in our folklore and superstitions. Then surely much is left of wizardry in the jungles of Africa!

MEDICINE MAN AT WORK

Members of the Vachokwe tribe in central Angola (Portuguese West Africa) resort to blood letting with cupping horns to relieve pain. (Museum Expedition photo.)

There was no magic in my landing in Portuguese West Africa, except the wizardry of the tropic sea and the waving palms. The heat, the flies, and my argument with the customs officers were all most prosaic. But let us march into the hilly plateau where quiet villagers lead their sheltered lives untroubled by European clothes, trade-cloth, and trashy ornaments. In the eastern hills of Nigeria are still to be found women whose entire wardrobe consists of a bunch of freshly picked leaves.

THE GHOST TALKS

In a quiet village of Angola, Portuguese West Africa, I heard a drumming. Nothing unusual about that. But what is that strange object slung on a pole supported by two bearers? It is the coffin of a twelve-year-old boy, and the ceremony has been arranged to question his ghost, which stays by the coffin for three days.

"Was it witchcraft that killed you?" asked an old man, holding up a plate of food for the ghost. The pole swung backward. The ghost had answered "No." At last all were assured by a forward swing of the pole that the boy had died of a "pain in his belly" and there was no need to resort to the old-time device of accusing someone, who then had to drink of the poison cup to establish his innocence.

The Ford truck made a pleasant run southward to Caconda, and there, right in the shadow of the ancient monastery (he ought to have known better), sat a hoary medicine man.

"What have you in your basket, father?" Rather reluctantly the old man showed his treasures. What! a human leg bone. In the basket were a small hoe for digging up graves at night and a stone for grinding the bone to a powder for mixing with charcoal and fat. A patient carries this mixture around his neck in an antelope horn or a tortoise shell, and from time to time eats a little of the concoction. It is a panacea for all ailments.

BLOOD AND BEER

We are led around a village by a hospitable chief, but we may not enter the little thatched house where two guardians stand. "Why?" we ask. It is the house of bows. We peep in, and there hanging on the walls are the weapons of dead chiefs. Before a hunter sets out he anoints the bows with blood of a sacrificed chicken and with a libation of beer. The aid of his hunting ancestors has been assured. Then he bathes his eyes with a magic potion brewed by the old medicine man, and success is doubly assured, for his vision will be keen.

A noise of heavy pounding reaches our ears. The blacksmith is at work swinging his huge iron hammer—the Negroes are clever blacksmiths everywhere in Africa. "Can we buy some tools?" There is a chilly silence. "What is that funny little figure by the anvil?" Again no answer. But the days pass and confidence is gained.

Every boy serves an apprenticeship of two years. Then his master makes a set of tools from which the youth must never part, on pain of death. The implements have been consecrated by the blood of sacrifice, and the little wooden figure, in former days at any rate, was said to contain the spirit of a man, who, murdered by the blacksmith, entered the wooden effigy and aided the artisan at his work.

Squatting on his haunches in one of the villages is a medicine man Yes, he must be crazy! He gazes intently at two objects, a tortoise shell and a rattle. The former he spins quickly on a slender stick, while shaking the rattle and talking volubly. His spells will make the thief return to the village, there to receive justice.

WET SEASON RAIN-MAKER

And how convenient to have a rain-maker, but how disappointing to learn that he makes rain only in the wet season, or when the first clouds gather. Quite rightly he refuses to risk his reputation by performing in the middle of the dry season, but he is willing to demonstrate his technique. So round he prances, whistling, waving a switch, and stretching up his hands to draw down the flood, which, with slow motions, he distributes evenly over the ground—only now none appears!

The scene shifts to Nigeria, thousands of miles from Angola, to Negroes of different appearance, language, and customs. But the magic does not change. Even the Yoruba who have been in contact with Europeans for four centuries have their sacred white crocodile with a priest in charge of it.

Today at Benin in southern Nigeria one stands before the sacred altar. The steps, the bronze heads, everything is splashed with blood, fortunately only the blood of chickens and goats, for the days of human sacrifice ended in 1897. There before the altar the slaves were clubbed to death so that their spirits might go to serve their dead master in a land of ghosts.

DRINK INK TO END PAIN

There is magic everywhere. At the door of his mud house an aged Mohammedan is writing charms, sacred texts from the Koran. He sews them neatly in leather; they are a talisman against snake bite, sickness, and the evil eye. Even the ink used for the texts can be washed from the smooth writing boards and drunk in water to cure pain.

Around a pan of rice I observed some old men of the Munshi tribe—prisoners! What could have been the crime of these placid, white-whiskered patriarchs? They were accused of murder in order to obtain blood to fertilize the ground, for the crops had been bad; so blood—the great regenerator—was demanded of the tribe. Were they guilty? I do not know, for I did not see the end of the trial, but I think it not unlikely that the charge was substantiated, for blood and magic, along with sacrifice and cannibalism, have been a driving power of African Negro religion from thousands of years ago, before the dawn of history.

SACRED WHITE CROCODILE

In pond at Ibadan, Nigeria (British West Africa). In former days such crocodiles were fed with human flesh. (Museum Expedition photo.)

Books—

(Continued from page 5)

breaking up around me and the sound of water puring into the hold, I played one record after another," he wrote. The last record was Chopin's *Funeral March*. "The Chopin dirge sounded above the moans of the dying *Karluk*," as she braced herself for the final plunge.

The loss of *Karluk* was but a prelude to the confused drama of mutiny, death and starvation that lay ahead. Bob Bartlett never then or since has had a more impelling occasion to rise to his full height. Against incredible odds he led the stranded caravan, including an Eskimo woman with two babies, dogs, sledges, supplies and a black cat, to Wrangell Island and to comparative safety. Then came the grave and bewildering question of rescue, which meant a journey on foot of seven hundred miles across the torturing polar ice to the coast of Siberia and thence all the long unknown way to East Cape and finally to Nome. It was a challenge Bob Bartlett had never faced before. He set out and made the epic trek in thirty-four days!

This unsurpassed journey was the climax of Captain Bartlett's lifetime of adventuring. With age and the passing of time his interest turned in the direction of a less dangerous and perhaps more useful occupation. Stimulated by his contacts with the personnel of scientific institutions, Bob Bartlett entered upon a career that combined his old love for the North with his new love for the flora and fauna of the North. For twenty years, Captain Bartlett and his little schooner, *Effie M. Morissey*, were inseparable partners. Together, they traveled well over one hundred thousand miles and became "itinerant procurers of Arctic specimens." "To survey Captain Bartlett's scientific collections is to review the biology of the Arctic regions," declared Waldo Schmitt of the Smithsonian Institution.

Captain Bartlett had few peers as mariner of the ice. He had none as the "linguist" he was. He spoke a language all his own, inimitable, often unpredictable. He could scarcely carry on a conversation without dipping heavily into words of the sea. One evening he was to escort Lady Northcliffe to dinner. When the critical moment came, he recalled, "The train of her dress was about ten fathoms long. The very sight of it set me adrift. And steer as I would, the damn thing was under my feet from the minute we cast off." Here is another example—an incident of bumping against a pedestrian, "I'd scarcely cast adrift, when, not paying proper attention to my course, I rammed amidships into a very pretty lady." It was equally difficult for him, regardless of the occasion and surroundings, to speak at length without mixing his salty rhetoric with one or two lusty oaths. Yet, no one ever heard a vulgar word from his lips. Even his so-called profanities had no trace of sacrilege in them. When he spoke before the Royal Geographic Society at Albert Hall in London, the audience literally broke loose and filled the hall with cheers even though "few of those ten thousand people in Albert Hall ever before had heard quite such words."

Mariner of the North is a living portrait of a fascinating sailor-explorer. It is also fascinating reading. George Palmer Putnam, the author, is to be congratulated for bringing Bartlett back to life. One sees the Captain, his oilskins and boots and all, pacing the deck of his beloved *Morissey*. Mr. Putnam's personal knowledge of Captain Bartlett and his own experiences in the Arctic have given the book tone and color rare in biographies drawn from records only. The book is more than a biography; it is a resumé of the important chapters of Arctic history. It is to be regretted that there are no illustrations in the volume.

A FIELD GUIDE TO THE SHELLS of Our Atlantic and Gulf Coast. XVII. By Percy A. Morris. Houghton Mifflin Company, Boston, 1947. 190 pages, 40 plates. Price $3.50.

Although there has been no lack of books dealing with the shells of the East Coast of the United States, the publication of this new one is definitely welcome. The existing works on shells of the region mentioned were either too large in size to serve as field books, or they were not detailed enough for the collector who wanted to have a pocket-sized book as a companion on his collecting trips. Morris' *Field Guide* now combines a handy size with a full account of all the shallow-water species of shells the beachcomber may expect to find. A clear text and excellent plates, both in color and in black-and-white, will make his classification of the collected treasures easy. Thus the new book will serve not only in the field, but also in the laboratory; it is heartily recommended to shell collectors.

FRITZ HAAS
Curator of Lower Invertebrates

JANUARY LECTURE TOURS

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays (the Friday tours open with an introductory lecture and slides or films in the meeting room on the second floor of the Museum); a schedule of these follows:

Fri., Jan. 2—Fashions in Foods and Beverages. Illustrated introduction with color pictures in Meeting Room (*Marie Svoboda*).

Wed., Jan. 7—Plants and Animals of Illinois (*Lorain Farmer*).

Fri., Jan. 9—Your Winter Vacation—Southwestern United States. Illustrated introduction with color pictures in Meeting Room (*Harriet Smith*).

Wed., Jan. 14—The Chopstick Culture (*June Buchwald*).

Fri., Jan. 16—Your Winter Vacation—The Caribbean—Plants, Animals, and People. Illustrated introduction with natural color pictures in Meeting Room (*Miriam Wood*).

Wed., Jan. 21—Circus Animals (*Jane Sharpe*).

Fri., Jan. 23—The Adventures of Carl Akeley. Illustrated introduction with color pictures in Meeting Room (*June Buchwald*).

Wed., Jan. 28—The Land of the Mummies (*Winona Cosner*).

Fri., Jan. 30—Animal Aviators. Illustrated introduction with color pictures in Meeting Room (*Lorain Farmer*).

Biology Smoker for A.A.A.S.

Approximately 2,000 scientists from all over the United States attended the "Biology Smoker" in Stanley Field Hall of the Museum on the evening of December 29. The smoker was sponsored by the American Association of Naturalists as a feature of the 114th Annual Meeting of the American Association for the Advancement of Science.

STAFF NOTES

Mr. Llewelyn Williams, Curator of Wood Technology, has resigned from the staff of the Museum as of December 31, 1947, to accept a position in scientific investigation and research with the L. A. Dreyfus Company. Mr. Williams will continue on the Museum staff as an honorary member, Associate in Forest Products. . . . **Mr. John Bayliss,** preparator in the N. W. Harris Public School Extension, has been transferred to the Division of Photography. For many years he has practiced the art of photography as a side-line and has done special work in this field at various times for the Museum. . . . **Mr. Emmet R. Blake,** Associate Curator of Birds, has been appointed editor of the *Middle Western Season Report* of the National Audubon Society, New York.

Entomologists' Meeting

The museum recently was host to a joint meeting of the Chicago Entomological Society and the entomologists of the Illinois State Natural History Survey and the University of Illinois. Following a session at which Mr. Karl P. Schmidt, Chief Curator of Zoology, was the speaker, the group toured the Department of Zoology laboratories.

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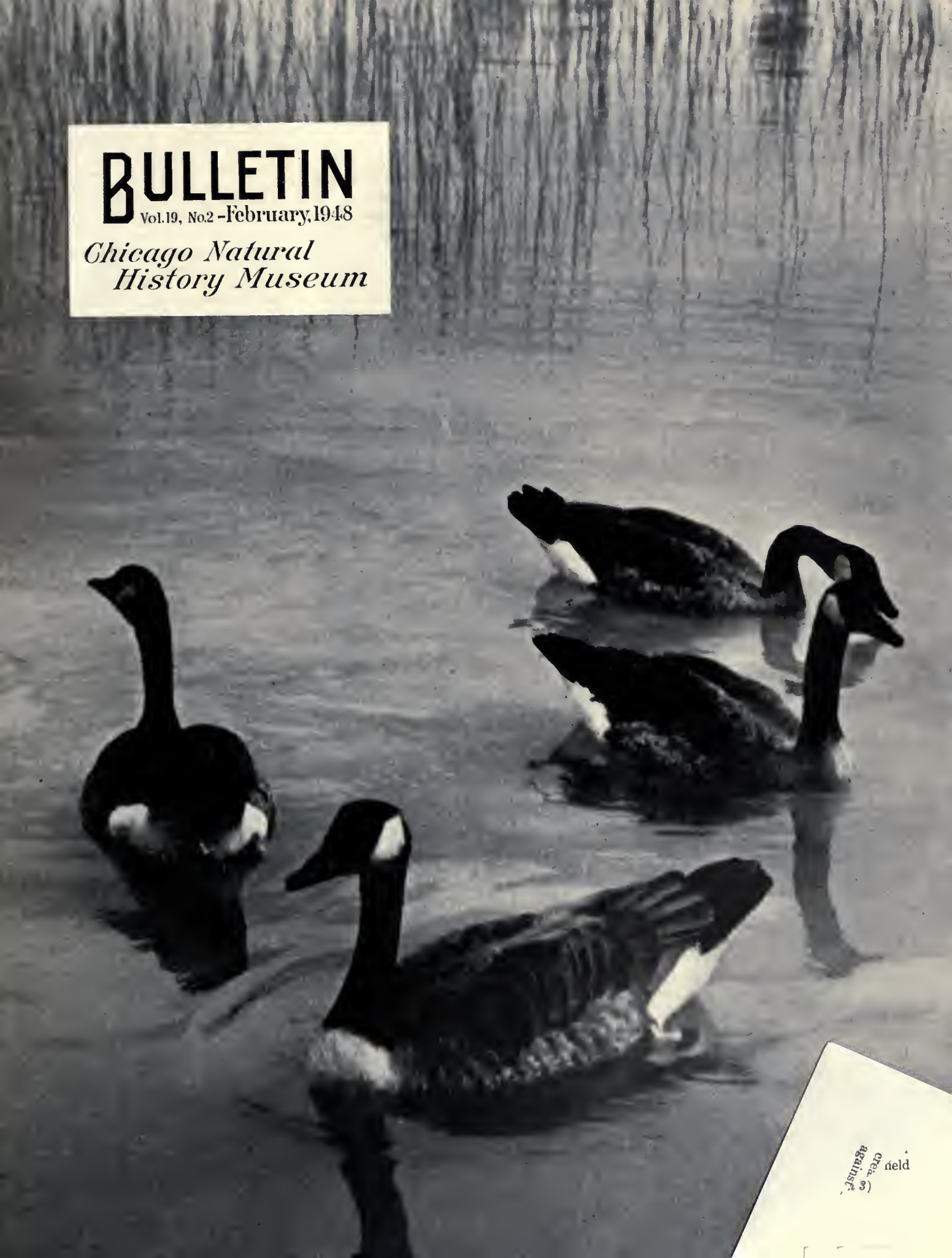


BULLETIN

Vol. 19, No. 2 - February, 1948

Chicago Natural History Museum

3rd CHICAGO INTERNATIONAL EXHIBIT OF NATURE PHOTOS

Local Camera Club's Show at Museum All This Month; Color Picture Screenings February 8 and 15

As this issue of the BULLETIN is distributed, the Third Chicago International Exhibition of Nature Photography is opening in Stanley Field Hall of the Museum, where it will continue until February 29, inclusive.

Because the judging did not take place until after press time for the BULLETIN, it is not possible to list the winners or to reproduce the winning photographs in this issue. However, a representative nature photograph from among the hundreds submitted has been used for the cover of this BULLETIN. The Nature Camera Club of Chicago is sponsor of the contest and exhibition, and prizes are being awarded by it and associated organizations.

The exhibition is divided into a black-and-white photograph section and a section of color transparencies. In each of these sections there are three classifications: General, Plant Life, and Animal Life. The General classification includes scenery, geological formations, frost formations, anthropological subjects (including archaeological sites), and miscellaneous manifestations of nature. There are prizes in each division of each section.

TWO SCREEN PROGRAMS

On two Sunday afternoons, February 8 and 15, at 3 o'clock, the accepted color transparencies will be projected in the James Simpson Theatre. By this means, the public will be able to see them to best advantage. At other times, about one-half of these slides will be exhibited, in a special illuminated case, with the display of black-and-white photographs.

The judges were: Dr. Theodor Just, the Museum's Chief Curator of Botany; Mr. L. H. Longwell, Associate, Photographic Society of America, well-known photographer, whose interests in nature are chiefly in geology; Mr. John R. Millar, Deputy Director of the Museum; Mr. Karl Plath, Curator of Birds, Brookfield Zoo, prominent artist and illustrator; and Mr. Lee Smiley, teacher of art and photography, Barrington High School, former president of both camera and nature clubs.

More than 1,600 entries were received, submitted by more than 400 competitors in most parts of the United States and from a number of foreign countries as well. The prizes in each division consist of medals and ribbons. The names of the winners will be inscribed on the Myrtle R. Walgreen bronze plaque, to be displayed for the first time in connection with the exhibition.

In addition to the medal and ribbon awards, the color division of the Photographic Society of America will award a silver medal to the maker of a slide outstanding in its illustration of complementary colors in nature and a second medal to one entering the best slide illustrating adjacent colors in nature.

ILLUSTRATED CATALOGUE

The Nature Camera Club will publish an illustrated catalogue of the exhibit to be sent free to all entrants in the contest and to be available to others at nominal cost, either from the Museum or from Miss Louise K. Broman, 6058 South Troy Street, Chicago 29, secretary of the club.

The first photographic exhibit of this type held at the Museum and probably the second in the United States was "Lenses on Nature," conducted by the Museum itself as a feature of its 50th Anniversary celebration in 1943. The First International Nature Salon held at the Museum under the auspices of the Nature Camera Club of Chicago was in 1946, and these competitions will now probably be continued. Plans for the 1949 event are already under way. In recent years, other exhibitions devoted exclusively to nature photography have been developed in various cities, the most recent being the First International Salon, "Photography in Science," sponsored jointly by the Smithsonian Institution and the *Scientific Monthly*, magazine published by the American Association for the Advancement of Science.

A list of winners in the Third Chicago International will be published in the next issue of the BULLETIN.

FEBRUARY LECTURE TOURS

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays (the Friday tours open with an introductory lecture and slides or films in the Meeting Room on the second floor of the Museum); a schedule of these follows:

Wed., Feb. 4—Plants the Indians Used (*Marie Svoboda*).

Fri., Feb. 6—Keeping Ahead of the Joneses—Entertaining for Prestige. Illustrated introduction in Meeting Room (*Harriet Smith*).

Wed., Feb. 11—Valentine Variations—Courtship Around the World (*June Buchwald*).

Fri., Feb. 13—Superstitions—Friday the 13th. Illustrated introduction in Meeting Room (*Miriam Wood*).

Wed., Feb. 18—War in the Wild—Conflict in the Animal World (*Jane Sharpe*).

Fri., Feb. 20—Your Winter Vacation—The Andes Countries. Illustrated introduction in Meeting Room (*June Buchwald*).

Wed., Feb. 25—Before the Dawn of History (*Lorain Farmer*).

Fri., Feb. 27—When the Lady Takes the Lead—Leap Year for the Birds and Beasts. Illustrated introduction in Meeting Room (*Winona Cosner*).

1,183,308 VISITORS IN 1947

Attendance at the Museum in 1947 totaled 1,183,308, a slight decrease from the 1,287,436 visitors received during 1946. However, the paid admissions on Mondays, Tuesdays, Wednesdays, and Fridays increased, the number being 137,680 in 1947 against 127,305 in 1946.

EXHIBITS OF INSECTS

Habitat groups of the insect life of the Indiana Dunes and of the life history of the tomato-worm moth, as well as three cases of North American and exotic butterflies, are in Albert W. Harris Hall (Hall 18).

MUSEUM FUN: ANSWERS TO LAST MONTH'S QUIZ

The answers to the ten quiz questions* that appeared on page 2 of the January BULLETIN are as follows:

1. The scale on a pangolin, which is a superficially reptile-like African and Asiatic mammal, is a protective body cover. 2. You would not take Atlantic skates on a winter vacation because they are shark-like fishes. 3. Tufted puffins are birds and they do stuff themselves with fish. 4. Weddell's seal is an Antarctic member of the seal family. 5. The black drum is a fish. 6. Stonecats also are fishes and are not known ever to "molest birds." 7. The squirrel glider is a phalanger, a member of Australia's curious fauna of pouched mammals. 8. Both sea lilies and Venus flower basket are marine invertebrates, the first being a crinoid and the second a form of deep-sea sponge. 9. A red hind would best be hunted with a hook and line because it is a fish. 10. Duckbills are Australian mammals despite the fact that they lay eggs.

***REPRINT OF THE QUESTIONS:**

1. What is the difference between the scale on a mandolin and the scale on a pangolin? 2. Would you take a pair of Atlantic skates with you on a winter vacation? 3. Do tufted puffins come with icing or are they stuffed with fish? 4. Would you close an envelope, or a fruit jar, or neither, with a Weddell's seal? 5. Would you play a black drum with sticks or a fish-pole? 6. Is it true or false that stonecats never molest birds or cause a disturbance at night? 7. Where would you look for a squirrel glider? At an airport? A playground? Or in a forest in Australia? 8. What are the difficulties of arranging a bouquet of sea lilies in a Venus flower basket? 9. Would you look for a red hind with a lasso, a hook and line, or a shotgun? 10. Duckbills are toothless, have fur, lay eggs, and nurse their young. What are they?

OUR COVER—

The picture on our cover is typical of some of the best photographs submitted for the Third Chicago International Exhibition of Nature Photography being held at the Museum February 1 to 29, inclusive, under the auspices of the Nature Camera Club of Chicago.

The title of this picture is "Birds, Branta canadensis canadensis (Canadian Geese)." It is the work of Mr. Roger E. Richard, of Dearborn, Michigan.

At the time of going to press, winners had not been chosen.

MAGNIFICENT MEDINILLA, NEW BOTANY EXHIBIT

BY THEODOR JUST
CHIEF CURATOR, DEPARTMENT OF BOTANY

One of the most beautiful tropical shrubs, *Medinilla magnifica*, is a native of the Philippines. It was named in honor of José de Medinilla y Pineda, one-time governor of the Marianas Islands. A model of Medinilla has been added to the Museum's botanical exhibits.

Medinilla was discovered just a hundred years ago (1847) in north-central Luzon by Thomas Lobb, a collector for the British firm of Messrs. Veitch, brought to a nursery

PHILIPPINE BEAUTY

Specimen of Medinilla magnifica reproduced in Museum botanical laboratories. Now on exhibition in Hall 29.

in Java, and finally introduced into England, where in 1850 it was exhibited before the Royal Horticultural Society. Its striking beauty immediately attracted attention. The plant is now widely grown outdoors in the tropics and in greenhouses throughout the temperate regions. It is readily propa-

(*Continued on page 8, column 3*)

17 EXPEDITIONS ON THE LIST FOR 1948

Museum Parties Will Scour the Depths of the Sea, And Explore Asia, the Southwest, Latin America

A deep-sea expedition in Bermuda waters to dredge up from depths of 8,000 to 12,000 feet some of the strangest creatures known to science—and, it is hoped, a number of new species not yet known—heads the list of 17 expeditions planned for 1948 by the Museum, it was announced by Colonel Clifford C. Gregg, Director, in the latter part of January.

Named officially the "Bermuda Deep-Sea Expedition, 1948," the project is under the joint auspices of this institution and the Bermuda Biological Station for Research, Inc., of St. George's in the Bermuda Islands. The latter organization's participation in the work will be supervised by its director, Dr. Dugald E. S. Brown, assisted by members of his staff. Leader of the expedition will be Mr. Loren P. Woods, the Museum's Curator of Fishes, and associate leader will be Dr. Fritz Haas, Curator of Lower Invertebrates. A number of other members of the Museum staff, to be announced later, will be included in the expedition personnel before actual work, scheduled for June 1, begins.

Based at St. George's, the expedition will have its own ship with a full professional crew of navigators and seamen. The vessel, the *Caryn*, is a 98-foot ketch assigned to the Bermuda Biological Station by the Oceanographic Institution (Marine Biological Laboratory), of Woods Hole, Massachusetts. In preparation for the three-month expedition, the *Caryn* will be put in commission and will sail to Bermuda in April.

For the Museum, the expedition will collect specimens of some of the world's most grotesque creatures—fishes, squids, crustaceans, and other invertebrates—for a projected new Hall of Deep-Sea Life. This hall will feature only the fauna of the far deeps of the sea—the forms of life that inhabit a world of complete darkness under tremendous pressure of water. It should be one of the most spectacular and interesting halls in the Museum, in the opinion of Mr. Karl P. Schmidt, Chief Curator of Zoology, who planned the expedition.

Other Expeditions

Southwest "Dig." Second of the three largest expeditions in the year will be the 1948 Archaeological Expedition to the Southwest under the leadership of Dr. Paul S. Martin, Chief Curator of Anthropology. This will be the 15th season of operations in the Southwest for Dr. Martin. This year's work will be conducted in New Mexico. Dr. Martin will be assisted in the excavations of prehistoric Indian sites by a large staff of archaeologists and technicians.

To Burma. A third expedition of unusual interest will be the Rush Watkins Southeast Asia Expedition, which will leave Chicago about September. This expedition, working largely in Burma and adjacent areas, will be conducted by its sponsor, Mr. Rush Watkins, Chicago businessman, and Dr. Austin L. Rand, the Museum's Curator of Birds. Its objective is a comprehensive ornithological collection.

Mammal Collecting. Mr. Colin C. Sanborn, Curator of Mammals, will leave in March for Arkansas to collect mammals of that state.

Insects of Guatemala. Mr. Rupert L. Wenzel, Assistant Curator of Insects, will leave in April for Guatemala, where he will make entomological collections.

Peru-Bolivia. Dr. Hugh C. Cutler, Curator of Economic Botany, will fly to Peru and Bolivia in April to conduct research and collect exhibition specimens of useful plants native to the Americas, principally those of the valley of Cuzco.

Cuba. In February, Dr. Cutler will go to Cuba for several weeks to join Dr. B. E. Dahlgren, Curator Emeritus of Botany, who is on the island at present engaged in an expedition studying palm genetics.

Prehistoric Reptiles. Dr. Rainer Zangerl, Curator of Fossil Reptiles, accompanied by several students, will dig for specimens of prehistoric reptiles and amphibians in an essentially unknown formation, the Alcova of central Wyoming.

Mexico. Mr. Melvin A. Traylor, Jr., Associate in the Division of Birds, will collect Mexican birds for about six weeks, beginning in June, in the Mt. Orizaba region. The expedition is a resumption of work begun by Mr. Traylor several years ago.

Alaska. Staff Taxidermist Frank C. Wonder will be dispatched to Alaska in July to collect accessory material for use in a projected habitat group of sea otters.

Fossil Invertebrates. Mr. Eugene S. Richardson, Jr., Curator of Invertebrate Fossils, will collect invertebrates of the Ordovician period (an era of some 450 million years ago) in the mountains of Pennsylvania.

American Geology–West. Dr. Robert Kriss Wyant, Curator of Economic Geology, and Mr. Harry E. Changnon, Curator of Exhibits, Geology, will make an economic geological collection of ores in the Black Range Mountains in New Mexico. They will also assemble specimens relating to physical geology.

American Geology–East. During the summer, Dr. Sharat K. Roy, Chief Curator of Geology, will continue systematic field

(*Continued on page 5, column 3*)

A NEW IDEA-EXHIBIT TO ILLUSTRATE EVOLUTION

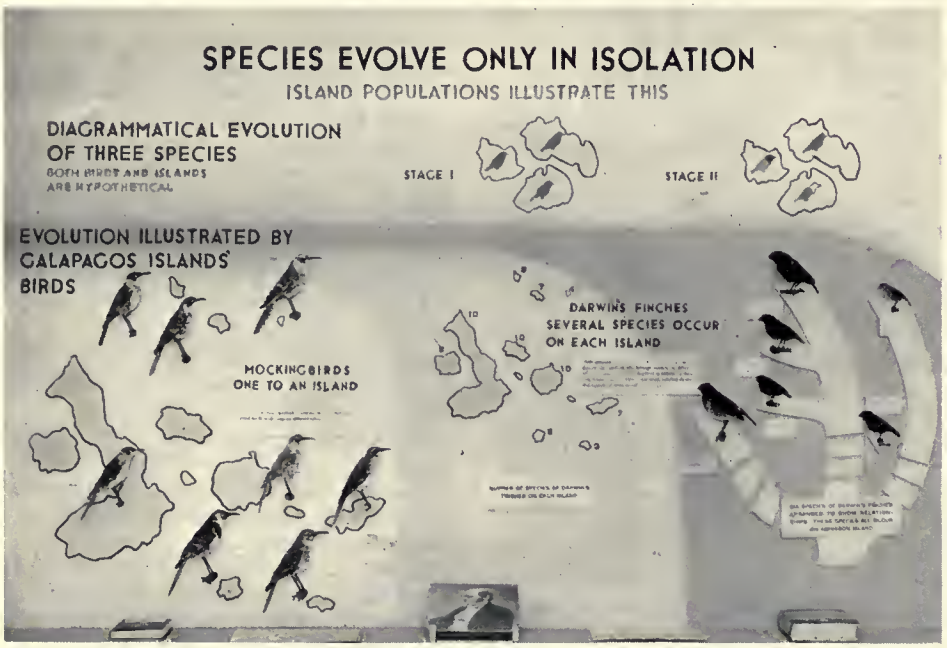
By AUSTIN L. RAND
CURATOR OF BIRDS

THE NEWEST exhibit placed in Hall 21 (Systematic Collection of Birds) shows how evolution works to produce new kinds of birds.

A museum is designed to deal with objects, with concrete things, called specimens. Specimens are kept, exhibited, and studied. But out of these studies emerge ideas; the ideas deal with the interpretation and with the relationships of these objects. And these ideas find their way into the exhibits.

The commonest idea expressed in bird exhibitions is that of relationships. The mounted specimens are arranged row on row, so that they are grouped in natural families, with the birds so arranged in each family that the closest relatives are next to each other. This is the main theme underlying the systematic arrangement of birds of the world in Hall 21.

We also have, in our North American series, a series of mounted birds selected with the idea of showing what birds live in a restricted area. Another idea appears in our group of restorations of fossil birds, with its glimpse of the ancestry of our present-day birds. Our exhibit "What Is a Bird" has as its central idea the differences between birds as a group and mammals, fishes, reptiles, and amphibians. Other exhibits have as their themes the birds introduced into North America and the birds exterminated in modern times. Complicated ideas can be expressed by the proper arrangement of specimens, with a minimum of words.


SPECIES EVOLVE ONLY IN ISOLATION
ISLAND POPULATIONS ILLUSTRATE THIS
DIAGRAMMATICAL EVOLUTION OF THREE SPECIES
BOTH BIRDS AND ISLANDS ARE HYPOTHETICAL
STAGE I
STAGE II
EVOLUTION ILLUSTRATED BY GALAPAGOS ISLANDS' BIRDS
MOCKINGBIRDS ONE TO AN ISLAND
DARWIN'S FINCHES SEVERAL SPECIES OCCUR ON EACH ISLAND

THE 'HOW' OF EVOLUTION

The exhibit recently installed illustrates part of the process by which new kinds of birds have come into being, are coming into being, and will come into being in the future. It is an illustration of the theory of evolution, predicated upon descent with modification.

No two birds of any kind are exactly alike; each bird shows differences. Sometimes these differences are small, discernible only on close comparison; sometimes the differences are considerable, apparent in a casual glance. Some individuals are better equipped than are others to find their food, mate, and escape their enemies. This variability is the raw material of evolution. Each year many birds die, from the weather, their enemies, or other causes. They are the less fit; the fittest survive. This is selection. Selection, working on variation, causes the population of an area to change gradually and become different.

Just as no two individuals are alike, no two places are exactly alike. Thus selection acts differently in each place. It follows, then, that the populations in various places will gradually become different, due to the different selection of different places. Although birds in different places may become very different, so long as the populations are in touch with each other they do not divide into species. For this crucial step to take place, for two different populations of one kind of bird to develop into two new kinds, another factor, isolation, must be present. The populations must be separated from each other.

ISLANDS IDEAL FOR STUDIES

Though all the birds of a Chicago garden are related and descended from a common ancestor, this relationship can only be inferred. They evolved so long ago, when conditions, through geographical time, were so different, that we cannot follow their relationships except through inference. But if we examine island groups where conditions are simpler, we can see more plainly how evolution works, for here the faunas are smaller and evolution in the process of operation can be charted. It was the conditions in the Galapagos Islands, the islands represented in our exhibit, that helped Darwin crystallize his ideas leading to the original formulation of the theory of evolution. And Darwin did not exhaust the interest of the Galapagos to biologists.

No natural example has quite the clear-cut decisiveness of a diagrammatic presentation. So in the Museum exhibit, instead of starting with a real example, we present first what happens on three hypothetical islands. From the distant mainland a pair of birds wandered by chance to one of these hypothetical islands, which was so far distant from the mainland that few kinds of birds had ever reached it. Competition was not keen and the birds thrived. Soon, through chance wanderings, the other two islands not too far away were colonized from the thriving population on the first island. On each of the three islands there then lived populations isolated from each other and from those on the mainland. This is the condition illustrated by Stage I.

The conditions on each island and on the mainland whence the island colony ancestors came are different. Gradually, through selection, each island population comes to

KEY TO EVOLUTION CHART

HOW SPECIES COME INTO BEING IS ILLUSTRATED BY EXAMPLES. Every individual bird differs from every other one, and each population from every other. Only where populations are isolated do they evolve into species. On island groups, where conditions are simple this is most easily seen.

UPPER RIGHT: A hypothetical example shows two early stages in speciation. Stage I: the same kind of bird has reached three islands; Stage II: through evolution each island population has evolved into a different species.

LOWER LEFT: The Galapagos Islands mockingbirds are an example of the early stage of evolution (Stage II). Long ago they came from the American mainland. In island isolation they evolved into different forms, but never more than one kind to an island.

LOWER RIGHT: When more than one species occurs on an island it is the result of successive invasions. Birds may wander occasionally from island to island. If this occurs before they have evolved into new species, they are absorbed into the populations of the island they come to. This may slow down evolution. But if it occurs after the different island populations have become species, they may start a new colony of their own species and in this isolation evolve into another species. By colonization, speciation, recolonization, etc., many species may come to live on one island, as shown by the diverse Darwin's finches.

differ more and more from its relatives. In time the populations may appear quite different. The islands are so far from the mainland that no chance wandering brings new immigrants during this period; the islands are far enough apart that the few occasional island-to-island wanderers are absorbed by the resident population, and only increase variability and perhaps slow up the evolutionary process of change.

DISTINCT SPECIES BEGIN

But sooner or later each island population becomes so different from its relatives on the other islands as to be a species. No longer would the different island populations interbreed freely if brought together. This is Stage II of our exhibit. For the sake of illustration, the head of each gray bird in Stage I has, in Stage II, been painted with a different color: one red, one yellow, and one green, to indicate that each population is different. Questions at once arise: Do stray individuals still sometimes find their way to other islands, occupied by sister-species, after Stage II of our panel is reached, and if so what happens? Also how is it that on some actual islands there are more species of birds than one?

The answer is that evolution is a continuing process. Wanderers continue occasionally, by chance, to make inter-island journeys. Formerly the wanderers were absorbed by the resident population and became part of it, but now that the three island populations have evolved into species, when these new species wander they retain their individuality and colonize anew. If a pair of red-headed birds should cross to another island at the same time, they might establish a colony of red-heads on the blue-heads' island. In this new place, separated by water from the rest of the red-heads and kept by biological characters from breeding with blue-heads, on whose island they are, they develop into still another species. The same thing is happening on the other islands and the process continues indefinitely. Many kinds of birds may come to live on each island. Thus Stage II is passed, and a complicated situation comes into being, comparable to the many related birds living in a Chicago garden—many species now living together but each evolved in isolation from its nearest relative.

How different kinds of birds come into existence has thus been illustrated in our exhibit with hypothetical examples. But the process is also demonstrated with actual examples, and the birds of the Galapagos Islands provide good ones.

ISOLATION IN THE GALAPAGOS

The Galapagos Islands are a group of oceanic islands on the equator, about 500 miles west of the South American coast. They have never had any land connection with any other land mass. The ancestors of all the land birds that live there now, and there are about 89 species and subspecies of breeding birds, have arrived as chance wanderers. The distance from the Americas is great, and for a bird species to establish itself, not one but a pair must wander. Thus it is a rare happening for a species to establish itself. The rarity of this happening is shown by the small size of the Galapagos total list of birds—108 species and subspecies compared with more than 700 from Guatemala in Central America and more than 1,500 from Ecuador, opposite the islands in South America. But this kind of colonization has happened at rare intervals.

The Galapagos mockingbirds illustrated in the lower left portion of the screen are comparable with Stage II of the hypothetical demonstration. All the mockingbirds of the Galapagos Islands are much more like each other than they are like any of the mockingbirds on the mainland of the Americas whence their ancestors came. Since the time that they arrived on the Galapagos Islands they have occupied many of the islands. In many cases, in the isolation of their island homes, they have developed or evolved into different kinds or varieties. The characters that distinguish the kinds or varieties may not be apparent to a casual glance, but by noting the distinguishing characters described on the label below each bird and then looking again at the specimens, it can be seen that one is darker or lighter, or has a longer or shorter bill, or is more or less heavily marked on the breast than the others. And careful study of the distribution of those birds by expeditions to the Galapagos Islands has proved that no more than one kind lives on any one island. These mockingbirds have been on the islands only long enough to reach Stage II, as set forth in the hypothetical example.

The Darwin finches are even more interesting. They, too, are more like each other than any one of them is like its nearest relative on the American mainland. Indeed, they have changed so much that it is doubtful what their closest relatives are. It is obvious from this that they have been on the Galapagos Islands much longer than have the mockingbirds, which still are recognizable relatives of the mockingbird-thrasher groups of American birds.

VARIATION IN FINCHES

This comparatively ancient colonization of the Galapagos Islands has also given the finches time to evolve into forms very different from each other. With the mockingbirds it is necessary to look closely to see that the numerous varieties are different. But the gray warbler finch, the small ground finch, the big ground finch, and the black-headed tree finch are so different that close study was necessary to demonstrate their near relationships. Also, the long lapse of time since they have arrived on the islands has enabled some to evolve separately on isolated islands, then to invade their sister-species' islands, evolve again into further species, and continue the process of colonizing, evolving, and again colonizing, until as many as ten species are found on one island, as is shown on the map in the lower center of the exhibit.

Thus we have shown how species evolve through variation providing the raw material, selection acting on this raw material to produce populations that differ from each other, and isolation of these different populations evolving into different species capable of recolonizing the territory of their related species. The new exhibit shows this process by hypothetical example and by two groups of Galapagos birds, the mockingbirds and Darwin's finches, that are actual examples of the products of such recent trains of events.

EXPEDITIONS—

(Continued from page 3)

study, in which he has been engaged for a number of years, of the basic igneous rocks found in the Adirondack mountain areas of New York state. He will conduct field studies also in New Hampshire and possibly in Massachusetts.

Central America. Mr. Paul C. Standley, Curator of the Herbarium, will leave in September on a botanical expedition to Central America. For a period of almost one year, he will continue collecting the flora of Salvador, Honduras, and Nicaragua in the areas in which he has already done preliminary work.

Seashore Mosses. Dr. Francis Drouet, Curator of Cryptogamic Botany, will collect cryptogams (mosses, seaweeds, etc.) for three months, beginning in September, in coastal areas of the Gulf of Mexico from Louisiana to Florida. He will work with both fresh and salt-water species and also with land species.

Colombia. Mr. Philip Hershkovitz, Assistant Curator of Mammals, will leave in October to spend about a year collecting mammals in Colombia.

Africa. Mr. Harry Hoogstraal, Assistant Curator of Insects, has already left to participate in the University of California African Expedition, which will conduct explorations from Cairo to Capetown or the length of the continent. He is a mammalogist-entomologist of the U. S. Navy Medical Science Group, on loan from this Museum. The Navy group is attached to the University of California Expedition and is under the direction of the Office of Naval Research.

Although acquired as far back as 1898, the Museum's model of the visible hemisphere of the moon, 19 feet in diameter, in Clarence Buckinghall Hall (Hall 35), is believed to be, by far, the largest and most elaborate representation of the moon's surface ever made.

Chicago Natural History Museum

FOUNDED BY MARSHALL FIELD, 1893

Roosevelt Road and Lake Shore Drive, Chicago 5

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Members are requested to inform the Museum promptly of changes of address.

STANLEY FIELD'S 40th YEAR AS PRESIDENT

For the fortieth consecutive time, Mr. Stanley Field was re-elected President of the Museum at the Annual Meeting of the institution's Board of Trustees, held January 19.

All other officers who served in 1947 were re-elected. They are: Mr. Marshall Field, Chicago publisher, First Vice-President; Mr. Albert B. Dick, Jr., Second Vice-President; Mr. Samuel Insull, Jr., Third Vice-President; Colonel Clifford C. Gregg, Director and Secretary; Mr. Solomon A. Smith, Treasurer; and Mr. John R. Millar, Assistant Secretary.

NEW MEMBERS

The following persons became Members of the Museum during the period from December 16 to January 15:

Associate Members

Maurice L. Cowen, Mrs. John D. Hrdlicka, John W. Page, Mrs. G. William Reynolds, Victor Segal, Francis H. Uriell.

Sustaining Members

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Annual Members

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STAFF NOTES

Mr. Karl P. Schmidt, Chief Curator of Zoology, has been elected to the Board of Governors (Honorary) and to the Board of Trustees of the Chicago Zoological Society. . . . **Dr. Alexander Spoehr**, Curator of Oceanic Ethnology, who is also a Research Associate in the Department of Anthropology at the University of Chicago, has begun teaching a course in introductory anthropology to classes at the downtown branch of the university. . . . **Mr. D. Dwight Davis**, Curator of Vertebrate Anatomy, **Dr. Fritz Haas**, Curator of Lower Invertebrates, **Mr. Philip Hershkovitz**, Assistant Curator of Mammals, **Mr. Bryan Patterson**, Curator of Fossil Mammals, **Dr. Alfred E. Emerson**, Research Associate in the Division of Insects and Professor of Biology at the University of Chicago, recently met in the office of Chief Curator of Zoology Schmidt with a distinguished group of zoologists interested in problems of zoological nomenclature. The occasion was the visit of Mr. Francis Hemming, secretary of the International Commission of Zoological Nomenclature. Others in the group who participated in a round-table discussion were: Dr. Curtis W. Sabrosky, of the United States National Museum; Dr. Charles D. Michener, of the American Museum of Natural History; Dr. Earle G. Linsley, of the University of California; and Dr. Hobart M. Smith, of the University of Illinois. . . . **Dr. Paul S. Martin**, Chief Curator of Anthropology, gave his lecture and motion pictures "Archaeology in Action" on January 16 before the Anthropology Club of the University of Chicago. . . . **Mr. Robert Yule**, formerly Assistant in the Department of Anthropology until forced to discontinue that work because of failing eyesight, has returned to the Museum after occupational therapy and special training in a school for the blind and is now employed in the Herbarium of the Department of Botany, where he is handling a variety of suitable work. . . . **Dr. Theodor Just**, Chief Curator of Botany, has been elected chairman of the Paleobotanical Section of the Botanical Society of America, and **Dr. L. H. Tiffany**, Research Associate in Cryptogamic Botany, has been elected vice-president of the American Phycological Society.

3 New Contributors Elected

At the annual meeting of the Museum's Board of Trustees, held January 19, three new Contributors were elected. (The designation "Contributors" includes all persons whose contributions to the Museum in either funds or materials range in value from $1,000 to $100,000.) Those elected are Mr. Albert H. Wetten, who is also a Trustee; Mr. Joseph Desloge, of St. Louis, who contributed funds for an expedition to Peru; and Mr. Charles Albee Howe, of Homewood, Illinois, who is also an Associate member.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Botany:

From: Dr. Walter Kiener, Lincoln, Neb.—89 specimens of algae, north central United States and Mexico; Dr. Francis Drouet, Chicago—733 cryptogams and phanerogams; Brother Antonio Garnier, Managua, Nicaragua—450 herbarium specimens, Nicaragua; J. Soukup, Lima, Peru—106 herbarium specimens, Peru; Prof. Eizi Matuda, Escuintla, Chiapas, Mexico—569 herbarium specimens, Mexico; Dr. V. J. Chapman, Auckland, New Zealand—23 specimens of algae, near Auckland.

Department of Geology:

From: Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina—3 casts of specimens of anteater foot bones; Filmore Turner, Oak Park, Ill.—17 invertebrate fossils, New Mexico; Harry Hoogstraal, Chicago—5 specimens of basalt and tuff, Hawaiian Islands; Eugene S. Richardson, Jr., Winnetka, Ill.—28 invertebrate fossils; Dr. Thomas B. Nolan, Washington, D.C.—a stibnite specimen, Japan; Stuart H. Perry, Adrian, Mich.—3 meteorites, Texas, Arizona, and Tennessee.

Department of Zoology:

From: Alex K. Wyatt, Chicago—125 beetles, insects, and allies, southwestern United States; Chicago Zoological Society, Brookfield, Ill.—a giant eland, 2 frogs, and 31 birds; Dr. Sidney J. Camras, Chicago—3 spiders, 4 ticks, and 2 fleas, Aleutian Islands and Illinois; Robert L. Fleming, Mussoorie, India—120 beetles, 2 cicadas, and a scorpion, India; Harry Hoogstraal, Chicago—4,963 insects, mostly Philippines, New Guinea, and Mexico; Eugene Ray, Chicago—36 Mordellid beetles and 6 mayflies, Illinois and Indiana; Luis de la Torre, Ann Arbor, Mich.—3 fleas, 11 lice, and 8 ticks, Wisconsin; Bryan Patterson, Harvey, Ill.—88 insects and allies, Illinois; Dr. Wolfgang Weyrauch, Tingo Maria, Peru—243 Peruvian land shells; F. E. Holley, Lombard, Ill.—32 parasitic flies, Texas, Illinois, and New York; Dr. Rainer Zangerl, Harvey, Ill.—7 salamanders, 6 frogs, and 4 lizards, Switzerland; Lincoln Park Zoo, Chicago—a three-toed sloth and a night monkey; Lawrence Curtis, Dallas, Texas—7 copperheads, Texas; Major Howard T. Wright, U. S. Army—156 insects and allies, Japan.

Library:

From: Dr. Fritz Haas and Paul C. Standley, both of Chicago; and Major Howard T. Wright, U. S. Army.

The Spring Course of Saturday afternoon lectures opens March 6.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

THE HYBRID-CORN MAKERS: Prophets of Plenty. By A. Richard Crabb. Rutgers University Press, New Brunswick, N. J., 1947. 331 pages, 16 illustrations. Price $3.

Here is the story of hybrid corn, told like a series of biographies of the men who made it. It is the history of the greatest development in food plants since man first learned how to farm, more than 5,000 years ago.

Until the hybrid-corn makers started their work, our food plants were improved by the same methods used by the ancients. Improvement of crop plants was done by simple selection of the better types, and quality and yield were increased only slowly. Until recently little use was made of our knowledge of botany.

As early as 1694 the Dutch botanist Camerarius had discovered pollen and the fertilization process in corn. Charles Darwin observed that increased vigor could be secured in corn by crossing unrelated strains. Yet these observations were scarcely utilized until recently. In the early 1900s intensive inbreeding was started to secure pure lines of corn. Pollen of a plant was placed on the silks of an ear of the same plant so that the progeny had only one immediate parent. The best of the resulting plants were then self-pollinated again and again.

In 1907 the first hybrid corn as we know it was grown from a mating of two dissimilar inbreds. The yield of corn per acre surpassed that of the best of the known corn varieties of that period; yet a period of ten years followed in which, although work was being done by a small group of scientists, little hope was held for an economically useful hybrid corn.

Seed for the hybrid plants was produced on small ears with irregular-shaped grains, the yield per acre was low, and the amount of hand labor required was great. In 1917 Dr. Donald F. Jones discovered a practical method to produce hybrid corn seed on vigorous hybrid plants, and shortly after that a small amount of commercial seed was available. In the last ten years hybrid corn has become so well accepted that in 1947 more than 98 per cent of the corn acreage in Illinois, Indiana, and Iowa and 67 per cent of that of all the United States were planted with hybrid seed. During World War I the United States raised a three billion bushel corn crop on 110,000,000 acres of land. In 1942 the same harvest was produced on 89,000,000 acres. The land and labor thus saved were turned to other war needs.

When one considers that in many years corn has grown on about one-fourth of all cultivated land in the United States and that the corn crop exceeded in value and volume the combined crops of wheat, oats, barley, rye, rice, and buckwheat, the value of a 20 per cent increase in yield can easily be seen.

Packed with facts, the book can be read with pleasure, for Mr. Crabb's main interest is in the people who worked with corn. From his extensive correspondence and many personal visits with nearly all the men who have taken part in the modern miracle of the synthesis of hybrid corn, Mr. Crabb has selected those incidents that illustrate the extensive efforts and the co-operation of the breeders which made hybrid corn possible. The work of these men occupies a place in American history similar to that of the fur traders and government explorers who opened the way to our West. But the hybrid-corn technique, which releases large areas of land and many workers, will eventually produce changes on a scale comparable only to those preceding the Industrial Revolution.

HUGH C. CUTLER
Curator of Economic Botany

HOW TRAVELERS FARE IN WEST AFRICA

BY WILFRID D. HAMBLY
CURATOR OF AFRICAN ETHNOLOGY

HOW did you travel? This was one of the questions most frequently asked on my return to Chicago after a journey of 10,000 miles in West Africa as leader of the Frederick H. Rawson Expedition of the Museum.

Recent years have brought rapid development in communication with Africa by airplane from England and France, and railways within the continent have been extended. Judging from the increased tourist traffic in the north and south that occurred before the war, Africa appears to be completely modernized.

This, however, is only a partial truth, for one is apt to forget the enormous size of the African continent, 12,000,000 square miles—four times the size of the United States. I am glad to say that many thousands of miles of line must be laid and years of airplane service will be needed before primitive man is robbed of all his elementary charm. Near the coast and inland close to European settlements he may assume European clothes and speak pidgin English, French, or Portuguese, but this is only a veneer of civilization. Far away in the hills a traveler can always find primitive life jogging along much as it might have done long before a white face was seen on the continent.

The Yoruba of Ibadan, southern Nigeria, have their sacred white crocodile guarded by a priest, and in a nearby temple are the wooden effigies of gods and divine heroes. In the hills of the Jos plateau, eastern Nigeria, the traveler is startled to see men who are devoid of even a vestige of clothing, while women of the Angas tribe are clothed only in bunches of leaves—a fresh dress, newly picked from nature's storehouse every morning.

PORTAGES THROUGH SAND

No traveler can say exactly how he intends to travel, for everything depends on the season and the nature of the country. Then again, some governments are more enterprising than others in making roads, and

COMFORT ON ONE WHEEL

At least, the one who rides on this porter-propelled monocycle is reasonably comfurtable on its seat springs. The vehicle is used for travel among the hills of Central Angola (Portuguese West Africa).

the possibility of making highways for motor traffic depends on the presence of stone. In central Angola, Portuguese West Africa, roads are excellent since a plentiful supply of rock from the hills provides the necessary material. But what a different story in southern and far eastern Angola where the truck is chug-chugging through sand, deep in the ruts, with the water in the engine boiling. Time after time, unloading is necessary, and after the truck has panted to the top of the sand dune all the baggage has to be carried up the slope.

A few miles slip by and then the next barrier in the obstacle race is seen—this time a weak wooden bridge across a swamp. Will the unloaded truck get across? At any rate, we must try. Half-way and no accident—excellent! Then comes a splitting and crackling of rotten timber and our back wheel is through the planks. In a few hours we are on the way again, and before us lies a broad river. An enterprising administrator may have obtained a metal boat from a parsimonious government—if so, we are lucky indeed. But on the contrary, a day may be spent in lashing together large dug-out canoes and fastening across them a platform to take the truck.

In Angola I found the best plan was to pitch a base camp near the coast and then

MYSTERY: WHY DOESN'T IT CAPSIZE?
Canoe of papyrus reeds, made by the Buduma tribe, Lake Chad, northern Nigeria.

to use a truck. Why not a car? It would be lighter for weak bridges, easy to transport on a raft, and little trouble to push out of deep ruts of sand. But what of the equipment that has to be carried? And how are the Museum collections to be brought back to the base camp? One large wooden drum may fill a touring car.

EXPERIMENT WITH AN OX

An elderly Portuguese tried to convince me that I would find an ox comfortable to ride upon. The ox certainly looked the essence of placidity with the rider's feet in broad brass stirrups depending from a broad saddle. But he did not like me. I got on at one side and off the other with remarkable celerity. Moreover, the animal walked at the rate of about two miles per hour, and a man cannot spend the rest of his life covering tropical Africa.

Years ago Boer farmers from South Africa introduced ox carts into Angola. These are heavy lumbering vehicles drawn by as many as sixteen yoke of oxen, traveling about three miles an hour, on roads to be used only for that traffic. The Portuguese forbid the use of these carts on roads made for motor traffic.

The old-time safari on foot has still to be followed, especially among hills in rugged country. The truck can be parked under guard and the essential baggage made into loads of about sixty pounds which native porters will carry about twenty miles a day, at a charge of 25 cents per man. But the Portuguese have forbidden this employment, and special permission has to be obtained.

The Ovimbundu were formerly renowned carriers who crossed from Angola to the eastern side of Africa, taking European trade goods and often returning with slaves and ivory. Large caravans are still seen, but these consist of men and women who are taking their beans, corn, and beeswax to Portuguese trading posts. There they sell their produce and buy ornaments of brass, bright metal combs, and tin ware which is gradually replacing native pottery. Trade-cloth, usually blue with white spots, is a favorite, and one seldom sees the old bark-cloth of native make, although it is still made and used for sacred ceremonies such as initiation of boys into the tribe. I entered an enclosure at Cangamba in eastern Angola, and there found boys making grotesque masks of bark-cloth for their dances.

Some of the native methods of transport are ingenious. As a rule the load is lashed between two long sticks so that, when resting, the weight is not lowered to the ground but is stood upright. Primitive people often carry a pig by lashing it to a pole—a very inhumane method it seems to me. The Ovimbundu have a more comfortable method for small pigs. They are carried in trays of bark. Four holes are made for the pig's feet, which are tied on the under-side of the tray. The animal lies in the hollow curve of the bark and is carried as a head-load.

A sick man is carried in a hammock, and the tepoia with a white canopy is sometimes used for carrying a recumbent chief or a European official, especially when the route lies off beaten tracks and in hilly country. Chickens are carried in native-made cages slung one at each end of a long pole balanced over the porter's shoulder.

Toward the end of the rainy season I landed in Nigeria for the second part of my expedition. Rivers had overflowed their banks in the south of Nigeria and, before setting out on a journey leading up into the southern Sahara desert, it was necessary to send telegrams to find out the condition of the highways. But despite precautions, the Ford truck went deep into the water of a flooded road between Lagos and Ibadan, usually one of the best roads in southern Nigeria.

But every day of the northward journey witnessed a drying of the country, until at last trains of camels were seen bringing their loads of peanuts into the great trade center of Kano. And in the huge bazaars where hundreds of artisans ply their trades in leather, silver, and basketry, patient oxen push their way slowly along the narrow streets. Farther north in French Niger Territory families may be seen on trek, the women, children, and baggage mounted on oxen while the father plods along on foot.

RIDING LIKE AENEAS

Sometimes, especially in swampy country such as that near Lake Chad, one is glad to sit astride the shoulders of a native who toils waist-deep in the mud carrying his passenger to a canoe. The frail-looking vessels are made by lashing together bundles of strong papyrus stems. The canoes become waterlogged in a few weeks, but when newly made they carry cattle and donkeys across the lake.

Thirty miles from Lake Chad the truck refused to plow the sand, and in other places the deep, wide, cracks in the dry mud were dangerous, for they nicely accommodated the wheels. The village chief who provided the horses had one concern—the appearance of the saddle rug. The girths apparently did not matter, for they were slack, with no method of tightening them beyond knotting. Stirrups were not adjustable; you had to twist the cords until they were the right length. From the cruel bit an iron projection touched the roof of the horse's mouth. One snag at the reins and the mount was going through all the feats of a circus horse, dancing on his hind legs and pawing the air. The natives use these bits so that they can pull the horses on their haunches quickly, even when riding at the gallop.

MEDINILLA—

(*Continued from page 3*)

gated from seeds or cuttings of young wood, and it flowers profusely even if only two or three feet high.

In its native habitat Medinilla grows as an erect shrub in ravines up to 5,000 feet elevation and is usually broader (20 feet in diameter) than high (8–10 feet). Its evergreen leaves are large (one foot long), opposite in arrangement, ovate or oblong-ovate, leathery in texture, dark and shiny above, pale underneath, and characteristically marked by nine to thirteen prominent veins curving upwardly from the midrib. But its chief claim to fame is seen in the magnificent pendulous rose-colored flower clusters (panicles), which may be 18 inches or longer. Each cluster contains between 100 and 150 flowers arranged on whorled branches that are four-ridged or winged. While in bud the clusters are clothed by large bracts (1–4 inches), the lowest of which are tinged with green while the others are rose-colored like the branches. After the flower cluster has emerged, the lowest bracts drop off.

The flowers are deeply rose-colored or coral-red, the large ones one inch in diameter, equipped with five petals and ten stamens whose peculiarly lobed or spurred appendages set Medinilla apart from other members of its family. The fruit is a berry.

The genus Medinilla contains more than 100 species, most of which are found in eastern Asia, in the Philippines and Pacific area. Two species, however, are found in Africa. Medinilla belongs to a large family of tropical plants, the Melastomaceae, containing nearly 200 genera and some 3,000 species. The family is particularly well represented in tropical America. The name is based on the fact that the edible berries of some species leave the mouth stained black (from the Greek words *mela*—black, and *stoma*—mouth).

The living material on which the new Museum exhibit is based was furnished by the Garfield Park Conservatory. Mr. Emil Sella, Curator of Exhibits, Botany, prepared the model, which is displayed in Case 854, Martin A. and Carrie Ryerson Hall (Hall 29).

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BULLETIN

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Chicago Natural History Museum

BIRDS USING TOOLS

By AUSTIN L. RAND
CURATOR OF BIRDS

A "TOOL," according to my desk dictionary, is "a simple mechanism or implement, as a hammer, chisel, spade, etc., used in working, moving, or transforming material. By extension, a machine—." Man has progressed so far in using tools that the present era has become known as the "Machine Age." But man has not a monopoly on tools. Birds along with some other groups of animals have a few species that use tools.

The clearest case is that of the woodpecker-finch of the Galapagos Islands. *Camarhynchus pallidus* is its proper name. It is one of a group of dull-colored finches restricted to the Galapagos. Before it became known that one species used a tool, the chief claim to fame of the group was that it, along with some other Galapagos animals, such as the giant tortoises, had a great influence in turning Darwin's thinking to the working out of the theory of evolution as set forth in his *Origin of Species*.

The woodpecker-finch feeds largely on insects that it gets by searching and probing on the ground and on trunk and leaves of trees. In searching crevices, the woodpecker-finch is handicapped by its rather short, thick bill. To offset this the bird picks up a slender, short length of stick or the spine of a prickly pear and with it pokes into crannies. The insects thus disturbed or driven out are seized. Sometimes the woodpecker-finch digs into the tree trunk and then gets a stick to probe with; sometimes it carries its probe about with it,

Cartoon by Peggy Collings Brown

poking in crannies until prey is disturbed. Then the stick is dropped and the food seized.

Although this is the clearest case of a bird using a tool, there are other cases that are borderline. The song thrush of Europe feeds in part on snails and winkles. And to get the soft edible animal out of its shell it carries or drags the snail to a favorite rock, its anvil, and there hits it against the anvil until the shell is broken and its contents exposed. The question is: Can this be considered as using a tool? If the song thrush moved or prepared the rock, which it does not do, there would be no question that it was a tool. The sea otter brings a stone from the bottom of the ocean and places it on its floating body to use as a similar anvil in cracking hard objects, and this undoubtedly is the use of a tool. At the other extreme are many species of birds that beat their prey on branch or ground, wherever they happen to be. The method of the song thrush is certainly an advance over that and can, I think, be considered as using a tool in a primitive way.

A few other species, too, bring shellfish to special places. Herring gulls on our northeastern coast pick up mussels and clams and, flying over a rock or some other hard surface, drop the shellfish and follow it down. If the shell is broken, the dish is ready for the gull; if the shell is not broken the gull takes the shellfish up to a higher altitude and tries again. Where hard-surfaced roads are conveniently located, gulls have learned to use them as shell-breaking places, and such roads become littered with shells. Crows of more than one species also use the same routine in breaking open shellfish, and they too have learned to use special hard surfaces, such as masonry walls, on which to drop the shellfish.

Here we have a number of species of birds, not especially closely related, that have evolved farther than their kin in their manner of getting food. By this means each is able to get food, or more food of a certain kind than it could otherwise. Although much of this activity has probably evolved along instinctive lines, learning is evident in the activities of gulls and crows that use a hard road or a stone wall.

The satin bowerbird of Australia, a species known to science as *Ptilonorhynchus violaceus*, has been considered as a case in point when discussing the use of tools. The birds are somewhat larger than a robin, the male glossy blue black, the female greenish. The male of this species constructs an elaborate bower, presumably for courtship purposes. It makes the bower of sticks and twigs and decorates it with bright and curious objects such as shells, feathers, bits of bone, and fruits, as do several other species of bowerbirds. But the satin bowerbird is unique in painting the inside of its bower. Fruit is crushed in its bill, and the bird, using its bill as the tool or paint brush, smears the fruit juice on the sticks on the inside of the bower. While this is a wonderfully strange habit, apparently unique in the bird world, it is doubtful if paint can be considered a "tool." If the satin bowerbird used a twig or a wad of moss or fiber (which it does not do) in spreading the paint, the case would be clear. But the bill is used as the tool for applying the paint, and this case does not seem to parallel the clear case of the woodpecker-finch using a tool.

THIS MONTH'S COVER

Reproduced on the cover of this BULLETIN is "Snow-capped," winner of the first prize medal in the general classification, color slide division, of the Third Chicago International Exhibition of Nature Photography held in Stanley Field Hall of the Museum during February.

The picture was made by Captain Martin L. Davis, of the Headquarters Pine Camp, Pine Camp, New York. Captain Davis supplies the following information about the picture:

" 'Snow-capped' was taken with a Contax III during the winter of 1945 in the Tirolean Alps while I was a company commander in the 42nd 'Rainbow' Infantry Division. I have been an amateur photographer for eight years but had never entered any exhibits until my wife, without my knowledge, entered this picture. I spent three years in Europe with the Army, mostly in Austria, and took several hundred color shots, of which this picture is a sample. 'Snow-capped' was taken on Agfa film and processed in England."

THE SWALLOWS OF CAPISTRANO —A LEGEND OF MARCH

There is a well-known story that the swallows of the Mission San Juan Capistrano return each year to their summer nesting place at the mission on St. Joseph's Day, March 19, and depart, or rather used to depart, for the South on St. Juan's Day, October 23, and have done this from time immemorial. A few days before March 19, when the swallows are due, a few birds appear as scouts and these go back to convoy the main flock. The time of day may vary, but it's always on March 19. Though St. Juan's Day has been the traditional day for the swallows to leave, in recent years the mission reports that they have been leaving earlier, in July. Such is a summary of the story as supplied by the mission.

The identity of the birds is easy. The swallow that makes its flask-shaped mud nests under the eaves of the mission is the cliff swallow, which also nests commonly elsewhere in California. Naturalists find that swallows arrive in California with great regularity in the latter part of March, and most of them leave by September. Naturalists do not, however, subscribe to the view that they reach and leave any given locality on a given day, year after year.

—A.L.R.

LECTURES ON SATURDAY AFTERNOONS IN MARCH AND APRIL

The Museum will present its annual spring course of free illustrated lectures on Saturday afternoons during March and April in the James Simpson Theatre. All lectures will begin at 2:30 P.M. They are restricted to adults—special programs for children will be given on Saturday mornings during the same months under the auspices of the James Nelson and Anna Louise Raymond Foundation.

Lectures in this course range in scope from explorations in the most remote parts of South America to Alaska and include adventures undersea with sharks, octopuses, and barracudas, the natural history of our own country, and studies of plant life through time-lapse motion picture films.

The dates, subjects, and lecturers booked for the Spring Course are as follows:

March 6—Wilderness Mischief

Dr. Olin Sewall Pettingill, Jr.

This is a film story of animal ecology—how mammals, birds, and other kinds of animals live in a wilderness community of northern Michigan. Various episodes in the narrative show how they play, gather food, compete for living space, build their homes, rear their families, and defend themselves against enemies. Characters in this wilderness story include bears, deer, foxes, raccoons, porcupines, chipmunks, bitterns, red-winged blackbirds, bobolinks, killdeers, ovenbirds, and red-headed woodpeckers.

March 13—Mexican Mosaic

Alfred Wolff

Mr. Wolff's color films and narrative present an "off the beaten path" panorama of our neighbor republic to the south. Mr. Wolff takes his audience all the way from the primitive to the modern, and the scenic splendors he shows range through mountain, jungle, and desert. His film shows life among the Mixe Indians of Oaxaca—people whose beautiful primitively costumed women rival the famed Balinese. In Yucatan he shows the fascinating studies of the lost empires of the Itzas and Mayas.

March 20—Down North

Alfred M. Bailey

There are few areas on the North American continent more interesting than the ice-bound shores of Labrador shown in this new pictorial film. On the schooner *Bowdoin* with Commander Donald MacMillan, Dr. Bailey visited remote trading posts along the glaciated northern coasts and photographed the interesting animal and plant life of this rugged region. Dr. Bailey was formerly a member of the staff of the Department of Zoology at this Museum.

March 27—Flowers in Action

John N. Ott, Jr.

Mr. Ott's films, made by time-lapse technique, are an interesting development of cinematography whereby plant growth of days, weeks, and months can be observed in a few minutes. Many varieties of common and rare plants are seen growing from seedling to maturity before the eyes of the audience. The flower's life cycle is presented in full natural color. Mr. Ott has been engaged in studies with this type of time-lapse pictures for more than twenty years, and the results of his work are regarded as a great contribution to the science of botany.

April 3—Seegooruk

Frederick Machetanz

"Seegooruk" means, in Eskimo, "freeze-up." Mr. Machetanz's film shows Alaska in the winter from the time of the fall freeze-up to the going out of the ice. Members of the audience start out as "cheechakos" and wind up as "sourdoughs." Features included are use and care of dog teams, winter hunting and fishing, and winter life in snug buildings. During the recent war Mr. Machetanz was engaged in naval intelligence work in the Aleutians and with the coming of peace was released from the Navy with the rank of commander.

RESERVED SEATS FOR MEMBERS

No tickets are necessary for admission to these lectures. A section of the Theatre is reserved for Members of the Museum, each of whom is entitled to two reserved seats. Requests for these seats should be made in advance by telephone (WABash 9410) or in writing, and seats will be held in the Member's name until 2:30 o'clock on the lecture day.

April 10—World Below the Waves

Vincent Palmer

Mr. Palmer has spent sixteen years in exploration and engineering projects undersea. During this time he has had many adventures and has been able to bring back in color films and in narrative much new knowledge about the denizens of the deep. In his films a diver is seen warding off with a knife repeated attacks of a six-foot barracuda. The collision and sinking of a boat are seen from below. There are "shots" of twelve-foot sea giants in violent combat, a swimmer struggling in the tentacles of a fourteen-foot octopus, and the latest methods of harvesting the resources of the sea.

April 17—Desert Gold

Peter Koch

Mr. Koch tells and in color film recreates by means of a new kind of symbolic photography the story of the first crossing of this continent in 1535. "Desert Gold" abounds with spectacular scenery, colorful flowers, and rare birds and insects found in the "lost world," a naturalist's paradise of the Chisos (Ghost) mountain area of west Texas. There is a remarkable study of the rarely photographed golden eagle that shows the life of an immature bird after it leaves the nest. For seven months this bird was followed over the wild mountain country west of the Pecos, a chase that gave Mr. Koch the most exciting experiences in his twenty years of wild-life photography. A highlight of his adventure with this noble bird of prey was flying with the eagle in search of game and photographing the kill.

April 24—Life Among the Primitive Fuegians

Col. Charles Wellington Furlong

This lecture discusses the way of life of the Fuegians, Indians who inhabit the great island of Tierra-del-Fuego and the adjoining islands and channelways. These people, now almost extinct, are among the most primitive of the world. There are four tribes of Fuegians—the Yahgan, Alacaloof, Ona, and Haush. The Yahgan and Alacaloof are canoe people of the channelways and coastal regions of the Fuegian Archipelago; the Ona and Haush are foot people of the forest fastnesses of Tierra-del-Fuego, the Ona tribe living like Stone Age men.

PHOTOGRAPHIC 'ESSAY' ON ATOMIC ENERGY

In the belief that atomic energy still is, or should be, a matter of great public interest, the Museum will display a photographic "essay" on the subject, prepared by *Life* Magazine. The exhibit will open March 12 in Stanley Field Hall.

Thirty large photographs, some of which have never before been available, outline the story of events leading up to the development and present-day use of fissionable materials and isotopes of elements. The text of labels was drawn largely from the Report on the International Control of Atomic Energy prepared for the Secretary of State and from a running commentary by Dr. Arthur Solomon, Assistant Professor of Chemistry and Physics at Harvard.

In conjunction with the *Life* photographs, the Museum's special exhibit of uranium ores and their known distribution will be temporarily transferred from the Department of Geology for display in Stanley Field Hall during the exhibition, which will continue until April 9.

WOOING IN THE WILD: ANIMALS THAT COME BEARING GIFTS

By MARGARET J. BAUER

IT MAY not be flowers and candy but it gets the same results! Like man, the lower male animal has learned that a gift in the hand does wonders toward friendlier relations between the sexes—although not all animals have the same ideas about what makes the ideal gift.

Birds are probably the most practical. A grebe will bring weeds, a heron will bring sticks, and a penguin will bring stones, each bird bringing the material from which its nest is made. This is, of course, a gentle hint to start housekeeping.

Insects are a little more on the idealistic side. In certain species of flies the male presents the female with a choice morsel of food wrapped in a glistening bubble that he secretes. The bubble usually is larger than he is, which makes him and his gift very conspicuous. Other flies, disdaining gifts as unaesthetic as food, present the lady fair with bright objects, such as flower petals wrapped in bubbles.

Certain web-spinning spiders wrap up a fly in fine silk and present this to the female. The old saying "Beware of Greeks bearing gifts" might well apply to spiders also, for scientists have found that occasionally a male spider will offer a fly it had itself previously sucked dry.

Cave-Man Stuff

If you're the owner of a tropical aquarium, you've probably noticed and commented on the ferocious behavior of the sword-tailed fish. The handsomely colored male will swim excitedly around the female, giving her an occasional dig with his stiletto-like tail. It isn't a fight; its only their way of making love.

One of the most peculiar courtships is that of certain land snails. Cupid probably got his bow and arrow idea from these creatures, for the males are armed with sharp darts, which they shoot at any female that takes their fancy.

Certain species of spiders get right down to the business of wooing on sight of a female. It she tries to escape, the male will grab her leg roughly in his jaws until she shows no sign of running away. Some spiders go as far as to tie the female to the ground with such a quantity of silk that she ultimately has some difficulty in tearing herself free.

In other species the male spider has a Sinatra effect on the females. The lady is usually so overcome by the approach of the wooer that she falls in a cataleptic trance. With her leg clasped in his jaw, the victorious male then returns home.

Patience Does It

The little male web-spinning spider goes to the other extreme in his courtship. He advances softly to the web of his sweetheart, and with his claws pulls strongly at the threads. He taps impatiently, proceeds, retreats, and circles round the female's refuge. If he continues this often and long enough she will reply, pulling the threads at her end, a real exchange of tender sentiments. After a while she may decide to come out and advances a little from her retreat. But she must be made to come out on to the web, and the male goes to seek her. He takes her foreclaw in his and gently, very gently, drags her toward him. Sometimes she is afraid, and escapes back to her retreat. Then he begins his courtship all over again.

'LIKE A LITTLE BOY SHOW-OFF'
Prince Rudolph's blue bird-of-paradise hangs upside down to impress his ladylove (Hall 21).

Probably of all courtships the spider's is the most elaborate, and there is a very good reason for this. If the female doesn't recognize the male as a potential wooer, he stands the chance of being eaten by his intended bride.

Let's Dance

Dancing is quite common as a form of courtship. Even in the lowest animals, the marine bristle-worms writhe and contort themselves in a frenzied dance among the females.

Among the birds, probably the most striking dances are those of the European ruffs (of which there is a habitat group in Hall 20) and the American prairie chickens and sharp-tailed grouse. In spring, the ruff males gather at definite dancing areas and hold a community "jam session." Anywhere from half a dozen to twenty or thirty males will take part. They whirl round and round

IF ADMIRING FEMALES ARE NEAR, THE SEA LION WILL POSE, HEAD THROWN BACK, FOR HOURS
(Habitat group of northern or Steller's sea lions of the Pacific—Hall N)

like dervishes in their excitement. The gathering is entirely male. When the female visits the dancing platform the scene immediately changes. The ruffs squat, with wings outstretched and beaks to the ground as though hypnotized. The female will then walk among the prostrate males and, when she has made her choice, touch him with her bill. The various grouses go through all the postures of fighting but never touch a feather.

In the case of scorpions, the male and female dance together with interlocked and even intertwined "tails." After mating, the male is devoured by his spouse.

Troubadors and Serenaders

Many animals accompany their love-making with music. The grasshoppers scratch their legs together, and the familiar summer evening chirping of the crickets is made by the vibration of their wings.

We are all acquainted with the songbirds, but we may not be aware that the singing of the male serves a purpose other than serenading the female. It is necessary for each male bird to appropriate an area or territory for a nesting site and he sings to warn other males not to encroach. His song serves the purpose of letting any female within hearing know that here is an eligible bachelor, and it also is a warning notice to other males—trespassers keep out or fight!

There doesn't seem to be any accounting for tastes in song. The female plant-cutter of South America evidently thinks the serenade of her mate, which sounds like the squeak of two tree limbs scraping in the wind, just as lyrical as that of the thrush or nightingale.

Some birds go in for beating out their love calls. The ruffed grouse of North America will select an old log or stump and "drum" out a love-call to his mate. This is done by beating his short, stiffly feathered wings against his body. It is a dull thumping at first and then gradually becomes a steady, pulsating roar. Many woodpeckers drum their beaks with incredible rapidity on dead branches to make a resonant note. If a tin roof is available, they generally forsake their wood instrument for the "brass."

Show-offs

Through the ages, the display of manly strength—the strong man of the circus, the handsome lifeguard on the beach—has always impressed the womenfolk. A female gorilla will find the sight of her mate, with flexed biceps and fists thumping his chest, irresistible. The elephant seal will pose for hours with head thrown back and chest extended if there are admiring females nearby.

In sea lions and sea elephants (both shown in elaborate habitat groups in Hall N—Marine Mammals), the bulls, who are enormously bigger and stronger than the cows, come ashore during the breeding season and stake out mating territories. As the females land, the males fight for them and establish harems. In some species they may seize the cows by the neck and pitch them over their shoulders into the harem.

Scientists have never been able to agree as to the reasons why the male in the lower animals is usually the more brilliantly adorned. The consensus of opinion seems to be that their decorations are mainly to make them conspicuous and recognizable to the female.

Certainly, nature went to an extreme in adornments in the birds-of-paradise. The most ornate of all, the Prince Rudolph's blue bird-of-paradise, has nuptial plumes of marvelous pastel shades of blue, mauve, lilac, and maroon. In contrast to this exquisite plumage, his spouse is a drab crow-like bird. Not content with exhibiting his fine feathers, the Prince Rudolph's blue bird-of-paradise must, like a little boy showing off, hang upside down from a branch while making his nuptial display.

Perhaps the most striking display of all is that of the Argus pheasant. His long brown wings are patterned with a series of white spots, which are wonderfully shaded so that they look like large eyes. When exhibiting himself he spreads his wings and throws them forward, like the bell of a great flower. The long tail plumes are waved up and down behind, and from below one wing an eye peeps out to keep the hen in view.

Wooing in the wild can be comic or tragic, elaborate or plain, but probably the most appealing from the aesthetic point of view is that of the Hepialus butterflies. Nature has endowed the male with pouches lined with scent-producing glands. His last pair of legs is also transformed into organs rather like giant powderpuffs, which are normally kept inserted in the perfume pouches. When he comes acourtin', out come the giant powderpuffs from their "perfume bottles" liberally doused with scent, and the perfume is daintily shaken over the female.

INDIANS BEFORE COLUMBUS* **is the first total review of the prehistory of North America, this side of Mexico, that is at once authentic and intelligible to others than specialists. It takes nothing for granted; it explains everything in non-technical words. Each type of ancient culture in every area is described briefly, simply, and in its relation to others, and is dated approximately or by estimate. Above all, the book is organized: everything is in its place and can be readily found there. The volume will therefore be invaluable, both as a textbook in the teaching of American Indian archaeology and as a handbook or reference work for the intelligent amateur and interested layman looking for basic orientation in the prehistory of the United States and Canada.—A. L. Kroeber, *Professor of Anthropology, University of California (Berkeley).*

*By Paul S. Martin, George I. Quimby, Donald Collier. $6—at Museum Book Shop.

PALEONTOLOGICAL PUZZLE

By JAMES H. QUINN
FORMER CHIEF PREPARATOR, PALEONTOLOGY

Mysteries are always intriguing, once all the involved facts are accumulated and their individual significances appreciated. The task of fitting them together sometimes leads to odd but conclusive answers. One of the most unusual mysteries to confront the paleontological staff came to light during the preparation of a large slab of soft sandstone containing remains of prehistoric animals of early Pliocene age received at the Museum laboratories recently.

Fossil specimens may be preserved as individual bones, as stream-accumulated collections containing "odds and ends" of bones of many animals, or as articulated skeletons where the bones retain their normal relation to one another. In this last exceptional and infrequent case, the collector expects to find all the parts of a skeleton intact, except those that have been eroded away by weathering in the uncovering process.

It was thus quite disconcerting to discover, as the bones of the Pliocene slab were cleared of matrix, whole series of cervical vertebrae, pelvic girdles, entire hind legs, and numerous skulls, with lower jaws, invariably lacking the occipital region. The animals represented were three-toed horses, camels, and oreodonts. After considerable brow-furrowing and theorizing, it was decided that the bones were accumulated by no physical agent of nature but rather by the work of a large carnivore or flesh-eater. The material represented the remains of victims intended to feed the families of the beasts of prey responsible for the killings. This theory was based on the belief that the hunters were not strong enough to drag away the entire victims and therefore dismembered the carcasses through the loins or neck, carrying home the hind quarters or the head, these being much lighter than the fore quarters. The hypothesis likewise neatly explained the opened brain cases, which otherwise could not be accounted for easily.

Oddly enough, all the animals represented were similar in size so that the predator would have been confronted with the same problem in every case.

The final "proof" of the correctness of this theory was uncovered eventually by the discovery of a perfectly articulated skeleton of a puppy of the large dog *Aleurodon* draped over the top of all the other bones in the slab. Of course, there is really no way of establishing positively that this carnivore-den hypothesis is correct, especially since the event took place millions of years ago, but the evidence certainly points to that conclusion, and the skeleton of the puppy, undisturbed from the day of its death, seems to lend some further credence to the theory.

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Members are requested to inform the Museum promptly of changes of address.

GEORGE KRUCK CHERRIE (1865–1948)

George Kruck Cherrie, who died on January 20, 1948, at his home in Newfane, Vermont, at the age of 82, was connected with Chicago Natural History Museum at various times during his life.

Mr. Cherrie served as the first Assistant Curator of the Department of Ornithology from 1894 to 1896. On an expedition to Hispaniola in 1894–95, he collected 1,958 birds in addition to mammals, reptiles, and fishes. On a second collecting trip to the Gulf Coast in 1896 he brought back almost 1,000 birds. In 1915 he was a member of the Collins-Day Expedition to Peru, Bolivia, and Brazil. When the Roosevelts, Kermit and Theodore, Jr., organized the James Simpson–Roosevelts Asiatic Expedition in 1925, Mr. Cherrie was their first choice as naturalist and collector because he was known to Kermit Roosevelt from the senior Theodore Roosevelt's Brazilian expedition in 1914. Mr. Cherrie had just returned from the Asiatic Expedition when he was asked to lead the Marshall Field Brazilian Expedition of 1926.

Mr. Cherrie was born in Knoxville, Iowa, on August 22, 1865. At the age of 12 he began work in the woolen mills, on the then current 14-hour-day schedule. The young George Cherrie went to the Iowa State College, at Ames, Iowa, at the age of 15, where he worked his way through the course in mechanical engineering. His special interests were divided between mathematics and natural history. He spent much time as a student at the small college museum, and this led him to work for a year at Ward's Natural Science Establishment in Rochester, New York, which was the training school for so many museum workers. After two years at Cedar Rapids in charge of the installation of an electric light plant, he turned permanently to collecting zoological specimens as a career.

During his life as naturalist and collector, beginning in 1888, he made more than forty expeditions, most of them in tropical America. In addition to his work for this Museum, he was employed by the Brooklyn Institute of Arts and Sciences, the United States National Museum, the National Museum of Costa Rica, and the American Museum of Natural History. He published various papers on birds, and an autobiography, *Dark Trails*, appeared in 1931.

—C.C.S.

STAFF NOTES

Members of the Department of Botany staff began a series of five lectures at Fisk Hall, Northwestern University, last month and will conclude the series in March. **Dr. Julian A. Steyermark,** Associate Curator of the Herbarium, lectured on "Flora of Guatemala and Its Geological History"; **Dr. Theodor Just,** Chief Curator of Botany, lectured on "Rates of Evolutionary Processes"; **Dr. José Cuatrecasas,** Curator of Colombian Botany, lectured on "Mangroves of the Pacific Coast of South America"; Dr. Just will lecture in March on "Hartmann's Theory of Sexuality"; and **Dr. Hugh C. Cutler,** Curator of Economic Botany, will lecture on "Useful Plants of the Andes." . . . In connection with the Museum's co-operative expedition with the Bermuda Biological Station for Research, Inc., scheduled to begin in June, **Mr. Karl P. Schmidt,** Chief Curator of Zoology, and **Dr. Fritz Haas,** Curator of Lower Invertebrates, who will be associate leader of the expedition, have been honored by election as members of the Bermuda corporation. . . . **Mr. Donald Collier,** Curator of South American Ethnology and Archaeology, has been appointed to the Committee on Dating by the Carbon-14 Method of the American Anthropological Association. In this capacity, Mr. Collier will co-operate in the selection of suitable archaeological material for tests of this new method of determining time passage by measurements made possible through a technique based on the radioactivity of the heavy atom of carbon. . . . **Miss Miriam Wood,** Chief of the Raymond Foundation, spoke on "Conservation Education at Chicago Natural History Museum" before a recent meeting of the Conservation Council of Chicago.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Botany:

From: Dr. Nicolás Angulo, Trujillo, Peru—30 herbarium specimens, Peru; Dr. Eizi Matuda, Escuintla, Mexico—200 herbarium specimens, Mexico; Dr. Max E. Britton, Evanston, Ill.—154 herbarium specimens, Dutch East Indies; Svend Anderson, Copenhagen, Denmark—a specimen of *Epilobium angustifolium*, Denmark.

Department of Geology:

From: Capt. Richard Grosvenor, Fort Clayton, Canal Zone—geological specimens, Canal Zone; A. Look, Grand Junction, Colo.—25 specimens of barite crystals, Colorado; Elmer Hackenbary, Sr., Pine Ridge, S. D.—2 fossil specimens, South Dakota; University of Chicago—9 fossil turtles, Kansas.

Department of Zoology:

From: Ernest P. Du Bois, Talara, Peru—66 lizards, 3 snakes, a scorpion, grasshopper, beetle, Peru, Ecuador; Herndon Dowling, Jr., Ann Arbor, Mich.—8 snakes, Florida; N. L. H. Krauss, Honolulu, Hawaii—a toad and a lizard, Mexico; Lieut. (j.g.) John F. Kurfess, Warrington, Fla.—26 reptiles and amphibians, Florida and Texas; Dr. Louis B. Bishop, Pasadena, Calif.—10 birds; Lincoln Park Zoo, Chicago—an adult cheetah; C. F. Graefe, Cuyahoga Falls, Ohio—2 pigeons; Harry Hoogstraal, Jewett Amadon, and Dean Amadon, Chicago—37 miscellaneous birds, Dutch New Guinea; Roger Conant, Philadelphia—5 frogs, United States; Mrs. Dessie Morrow and Miss Marion Clow, Lake Bluff, Ill.—a bird, Illinois.

Library:

From: Col. Clifford C. Gregg, Valparaiso, Ind.; Dr. Fritz Haas and Paul C. Standley, Chicago; and M. Celaleddin Izmirii, Istanbul.

NEW MEMBERS

The following persons became Museum Members between Jan. 16 and Feb. 14:

Contributors

Joseph Desloge, Charles Albee Howe, Albert H. Wetten.

Associate Members

Philip Bernstein, Earl J. Bush, Louis Frankel, Joshua B. Glasser, M. D. Strong.

Non-Resident Associate Members

Miss Lucy M. Brigham

Annual Members

C. M. Baldwin, Robert F. Bradburn, Reuben F. Brookstone, Edward W. Burkill, Albert Carroll, Miss Louise Dekker, John Ford Evans, H. K. Ferguson, John W. Godey, A. L. Godie, Robert E. Haskins, Mrs. William D. Hechler, Dr. Robert Henner, Maxwell R. Herman, Ray W. Ireland, H. A. Johnson, Herbert M. Johnson, A. E. Kollenberg, John T. Landreth, Harry W. Levy, R. C. Maxson, John H. McClellan, Joseph A. McInerney, Harold Meidell, Rev. Ariel O. Mortvedt, James J. Porte, Milton J. Sabath, Mrs. Carlo Scuderi, Henry L. Seaman, Mrs. Caroline H. Sparr, Walter R. Tuck, Irwin R. Tucker, Dr. Edward F. Webb.

THE UBIQUITOUS CRINOIDS, LAYMAN'S FOSSILS

By EUGENE S. RICHARDSON, JR.
CURATOR OF INVERTEBRATE FOSSILS

Of the many visitors who bring fossils to the Museum for identification, most bring pieces of crinoids that they have found. Attractive in themselves, looking like anything but a part of a drifting animal of the ocean currents, these pieces naturally compel one to wonder, on finding one in a beach pebble or a quarried rock, what they may be. Is this a worm? "No," says the helminthologist. Is it a plant stem? "No," answers the paleobotanist. Is it, then, a round mineral crystal? "Heaven forbid!" cries the crystallographer.

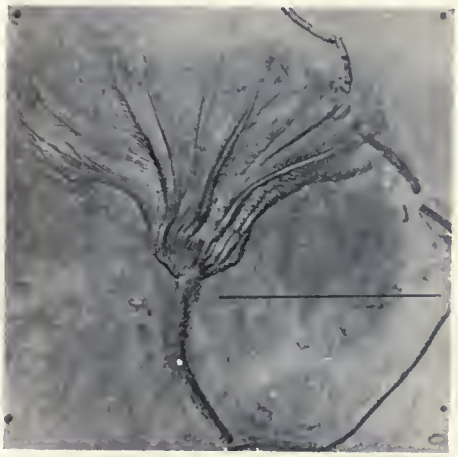

Fig. 1. A large and nearly perfect crinoid, Pentacrinus subangularis, from the Jurassic of Germany. The ruled line is scaled to the length of one foot.

Because the commonest crinoid fossils are the pieces of the broken and scattered skeleton, many of whose pieces are star-shaped, people have in the past taken them for "irradiations" of heavenly bodies, a view encouraged by the mediaeval astrologers. Few animals, indeed, can produce from the remains of a single individual fossils of such varied appearance.

Modern crinoids, often captured in fishermen's nets, and a relatively small number of perfectly preserved fossil representatives afford us a good understanding of the nature of these unusual animals. With the starfish, sea urchin, and a few other rare groups, some extinct, they compose the phylum of the Echinoderma, or "spiny-skinned animals." So far has the protection of the soft tissues progressed in this class that the entire animal is encased in a heavy armor of crystalline calcite, several hundred times as heavy as the animal inside.

MILLIONS OF PLATES

In spite of this heavy integument, crinoids are among the most flexible of creatures, for the skeleton is built of numerous small plates of calcite, each a part of an individual crystal, that are held together during the life of the proprietor by delicate ligamental tissues. After death, these connecting tissues very quickly deteriorate, and submarine currents scatter the plates so that not even a jigsaw-puzzle enthusiast could find and match them again. It is estimated that a large modern crinoid may have more than three million plates in its skeleton. Unlike the knights of old, the crinoids have the muscular power to feel and to act completely at ease in their armor, largely because of the buoyant effect of the sea water in which they live.

Because of the breaking up of the skeleton, it is unusual to find an entire fossil crinoid, such as the one on display in the case of Jurassic fossils in Frederick J. V. Skiff Hall (Hall 37), and they are among the most treasured of fossils. Like human beings, crinoids are gregarious animals, growing in great abundance where conditions are suitable, preferring clear, limy water. And, where quick burial in undisturbed water permits the perfect preservation of one crinoid, we can expect to find an abundance of them. In the Museum we have fine specimens from such beds in the Mississippian limestones of Iowa and Indiana. Assiduous collecting over the last three generations has now exhausted the supply from those places, adding to the rarity of our examples.

SEA LILIES 'TOIL NOT'

The illustration (*Figure 1*) of a nearly perfect *Pentacrinus subangularis** shows at a glance why the popular name of "sea lilies" has been bestowed upon the crinoids. With the long stem, the small, compact, "calyx," and the long feathery arms resembling petals, it seems surely some lily from a fantastic garden. Like the proverbial lily of the field, it toils not, neither does it spin. Some crinoids drift lazily with the ocean current; others root themselves to a rock or shell on the sea-floor, the roots furthering the resemblance to a plant (*see Figure 2*). A tenuous "nerve" or "tendon," passing through a central hole in each plate of the stem, gives the animal the necessary control of its distant roots.

Fossil crinoids are dull colored, but in their lifetime they must have been as bright as the modern ones, which are colored, in stripes, spots, patterns, or solid tints, with all the rainbow shades plus silver, black, white, and brown. An underwater "garden" of crinoids is strangely like a bewitched field of random wild flowers.

Although most plants take their food through their roots and with their green pigment, crinoids, being animals, must catch theirs. It is for this purpose that they have the long, many-branched arms rising above the calyx. The arms are five in number where they spring from the calyx, but they usually branch once, twice, or many times above that. An amazing variety is possible in the manner of branching, and many species are readily recognized from the form of their arms.

Certain crinoids, not rooted to the sea-floor, can swim by gracefully folding and unfolding their arms, which is certainly more than Sir Launcelot could have done in his armor. The main function of the arms, however, is to gather food. Crinoids, like sponges, eat only microscopic plants and animals from the water, and so do not have to grab their prey as does the octopus. Instead, each arm bears, on its upper or inner surface, a furrow covered with a roof of jointed calcite plates and lined with tiny hair-like cilia to propel the food-bearing water through the tube thus formed.

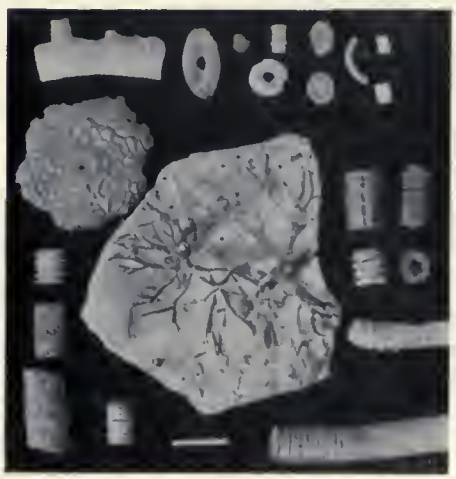

Fig. 2. Parts of fossil crinoids. In the center, the roots of two individuals of Eucalyptocrinus crassus, from the Silurian of Indiana; above and to the left of these, the bottom of a calyx of Batocrinus yandelli. The other pieces are broken stems and single stem-plates. The white line at the bottom represents one inch.

MAN'S DISTANT COUSIN?

The tubes collect water at the ends of the finest branches and carry it to the mouth, situated at the center of the top of the calyx, within the circle of arms. All the way, it travels through the protected tube, to the great discouragement of parasites and food-thieves. Certain crinoids of the South Atlan-

(*Turn to page 8, column 3*)

* Collected by Dr. Bernhard Hauff in the Liassic shale of Holzmaden, Wurttemberg (see "New Graveyard of Fossil Vertebrates in Wyoming" by Dr. Rainer Zangerl, BULLETIN, August, 1947).

Visiting Hours Change March 1

Beginning March 1, spring visiting hours, 9 A.M. to 5 P.M., will replace the winter schedule of 9 to 4. The new hours will continue in effect until April 30, after which the Museum will be open from 9 A.M. to 6 P.M. until September 6 (Labor Day).

NATURE PHOTOGRAPHY PRIZE WINNERS

With the exception of the names of prize winners that were not available at the time of going to press, a full account of the Third Chicago International Exhibit of Nature Photography held at the Museum under the auspices of the Nature Camera Club of Chicago appeared in the last issue of the BULLETIN.

Following are the lists of medal winners and awards of honorable mention:

MEDAL WINNERS

Black and White Photographs:

ANIMAL LIFE DIVISION: H. J. Ensenberger, Bloomington, Ill.—*Goggle Eyes.*

PLANT LIFE DIVISION: Ray L. Carroll, 6143 S. Troy St., Chicago—*Jack-in-the Pulpit.*

GENERAL DIVISION: E. C. Crossett, 1407 Railway Exchange, Chicago—*Forest Glen.*

Color Slides:

ANIMAL LIFE DIVISION: Edward A. Hill, Fleetwood, Pa.—*The Two-tailed Cat.*

PLANT LIFE DIVISION: Frank Proctor, Phoenix, Ariz.—*Cactus Beauties.*

GENERAL DIVISION: Capt. Martin L. Davis, Pine Camp, N. Y.—*Snow-capped.*

HONORABLE MENTIONS

Black and White Photographs:

ANIMAL LIFE DIVISION: Louis Quitt, Buffalo, N. Y.; Mrs. Dorothy Meigs Eidlitz, Riverdale-on-Hudson, N. Y.; Rodger E. Richard, Dearborn, Mich.; Tod Swalm, Silver Springs, Fla., and Dr. G. B. White, Port Colborne, Ontario, Canada.

PLANT LIFE DIVISION: Ray L. Carroll, 6143 S. Troy St., Chicago; John Voss, Peoria, Ill.; H. J. Ensenberger, Bloomington, Ill.; and Miss Esther Heacock, Wyncote, Pa.

GENERAL DIVISION: Ben Hallberg, Brookfield, Ill.; Dr. B. J. Ochsner, Durango, Colo.; Mrs. Caryl R. Firth, Trappe, Md.; and Giuseppe Rinaldo Confalonieri, Milano, Italy.

Color Slides:

ANIMAL LIFE DIVISION: Willard H. Farr, 6024 Dakin St., Chicago; R. E. McAdams, Springfield, Ohio; Edward A. Hill, Fleetwood, Pa.; Frank Bazzoni, Ottawa, Ill.; Miss Mary E. Owens, Toronto, Canada; and Mrs. Marian S. Kimble, Boise, Idaho.

PLANT LIFE DIVISION: Frank W. Bemm, Skokie, Ill.; John B. Brennan, Salt Lake City, Utah; Miss Marion R. Davis, Rochester, N. Y.; R. E. McAdams, Springfield, Ohio; Mrs. Helen C. Manzer, New York, N. Y.; Frank Proctor, Phoenix, Ariz.; and D. W. Williamson, Montrose, Colo.

GENERAL DIVISION: Russel Kriete, 5046 Cornelia Ave., Chicago; Roy A. Whipple, 66 W. Ohio St. Chicago; William L. Morgan, Monterey, Calif.; Jack Stump, San Diego, Calif.; Giuseppe Rinaldo Confalonieri, Milano, Italy; Miss Evelyn M. Flach, Buffalo, N. Y.; V. E. Ward, Angels Camp, Calif.; Wells W. Smith, Salt Lake City, Utah; and Mrs. Alice B. Rawson, Denver, Colo.

The final tally of entries exceeded 1,900 (300 more than reported in the last BULLETIN), of which 700 were accepted for the exhibition that was held from February 1 to 29, in Stanley Field Hall of the Museum. The competitors number more than 400 and represent several foreign countries as well as most of the states of this country.

MOVIES FOR CHILDREN SATURDAY MORNINGS

The spring series of free motion picture programs for children on Saturday mornings, presented by the James Nelson and Anna Louise Raymond Foundation, will open March 6 and continue through April 24. The programs are given in the James Simpson Theatre of the Museum, and all begin at 10:30 A.M. In addition to motion pictures, three of the programs will be accompanied by lectures, to be given by Mrs. June Buchwald of the Museum's staff, Frederick Machetanz, artist and lecturer, and Peter Koch.

Children may come alone, accompanied by adults, or in groups from schools, etc.

Following is an outline of the programs:

March 6—ANIMAL TALES
Some favorite animal pictures
Also a cartoon

March 13—LET'S EAT
Stories about foods
Also a cartoon

March 20—THE ENCHANTED FOREST
The adventures of a little boy in a friendly forest

March 27—ANIMAL ANTICS (Movies)
Furry young playmates
Lecture by June Buchwald, Chicago Natural History Museum

April 3—ESKIMO SUMMER (Color Movies)
How Eskimos live in the summertime
Lecture by Frederick Machetanz, Kenton, Ohio

April 10—GLIMPSES OF AUSTRALIA
Also a cartoon

April 17—BEAUTY IN THE BIG BEND COUNTRY (Color Movies)
Our newest national park in Texas
Lecture by Peter Koch, Marathon, Texas

April 24—MY DOG SHEP
The story of a boy and his dog in the great out-of-doors

MARCH LECTURE TOURS, DAILY EXCEPT SUNDAYS

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays (the Friday tours open with an introductory lecture and slides or films in the Meeting Room on the second floor of the Museum); a schedule of these follows:

Wed., Mar. 3—Denizens of the Deep—Underwater Life (*Lorain Farmer*).

Fri., Mar. 5—Sacred Animals. Illustrated introduction in Meeting Room (*Jane Sharpe*).

Wed., Mar. 10—"Be It Ever So Humble"—Housing Around the World (*June Buchwald.*

Fri., Mar. 12—Giants—Large Plants and Animals. Illustrated introduction in Meet-Room (*Miriam Wood*).

Wed., Mar. 17—The Gift of Green—Story of the Plant Kingdom (*Marie Sroboda*).

Fri., Mar. 19—Activities Behind a Great Museum—Stories of Expeditions and Research Behind the Scenes. Illustrated introduction in Meeting Room (*Lorain Farmer*).

Wed., Mar. 24—Animals in Domestic Service (*Harriet Smith*).

Fri., Mar. 26—Hats and Hair-dos, Masculine As Well As Feminine. Illustrated introduction in Meeting Room (*Harriet Smith*).

Wed., Mar. 31—Pranks Among the Animals—Every Day is April Fools' Day (*Winona Cosner*).

CRINOIDS—

(*Continued from page 7*)

tic, which haven't the covers on their food-grooves, are badly infested with parasites and are probably doomed to a not far distant extinction as a result. From the mouth, the food travels through an alimentary canal so well developed that many consider the echinoderms to be man's closest relative among the invertebrates.

If that is so, it enables us to trace our ancestry rather close to the "primeval protoplasmal globule" who was the first recorded ancestor in the family tree of Gilbert and Sullivan's Pooh-Bah, for the earliest echinoderms are reported to occur in rocks about 550 million years old. The first crinoids appeared about 50 million years later, as a specialized branch of the phylum that has provided abundant denizens of the oceans to the present day. Whether or not we care to think of echinoderms as possible distant cousins, they are in themselves rather fascinating members of almost every fossil collection in the world and among the easiest ones to find in the Chicago region.

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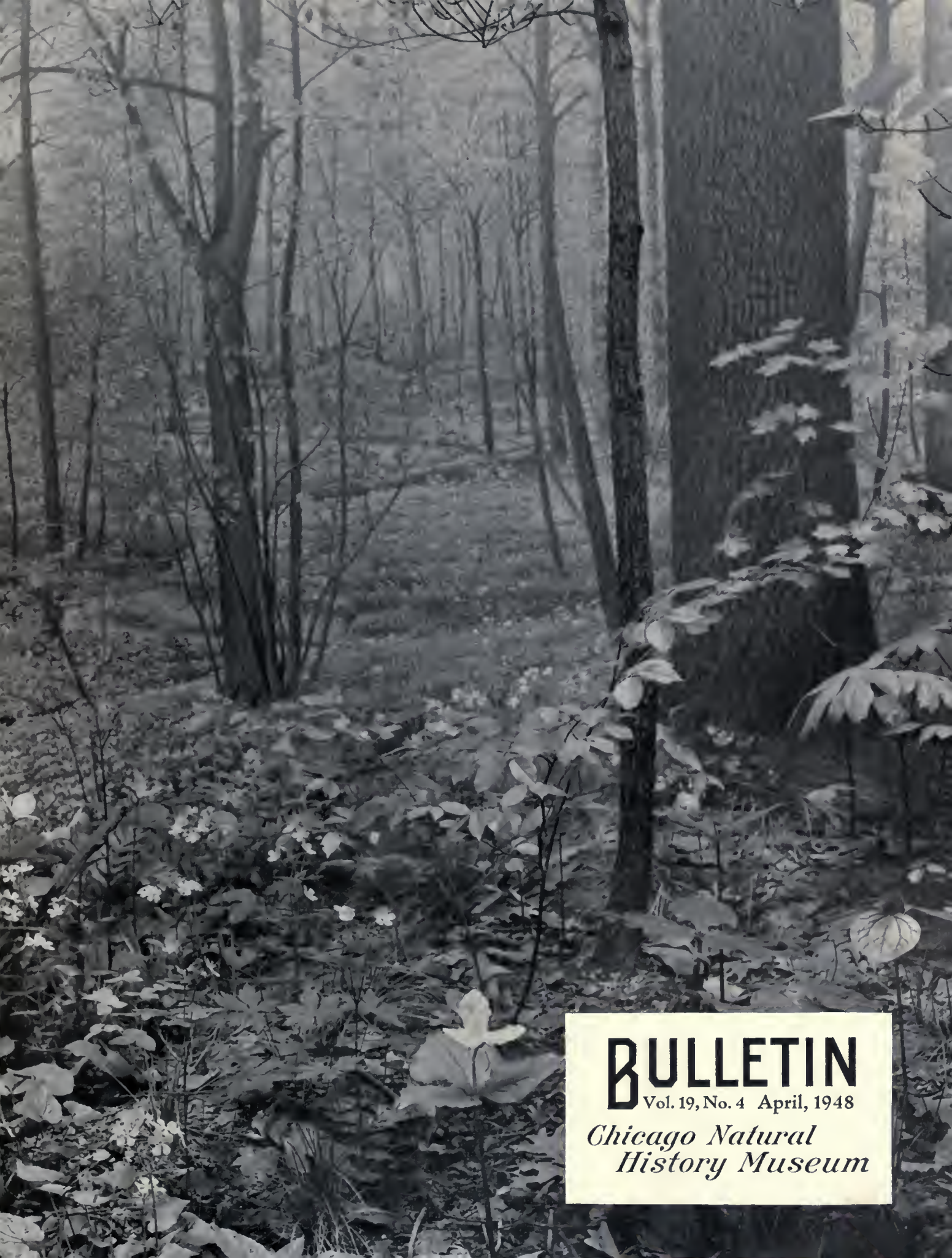

BULLETIN

Vol. 19, No. 4 April, 1948

Chicago Natural History Museum

UNIVERSITY GIFT: A VAST FOSSIL VERTEBRATE COLLECTION

By BRYAN PATTERSON
CURATOR OF FOSSIL MAMMALS

More than 300 million years ago, in that period of the earth's history known as the Devonian, some lobe-finned fish came out of the water. The precise manner of their coming is not known. But the event was one of the most momentous that occurred in the long history of life on earth, for it was destined to lead, among other things, to the rise of the dinosaurs and their eventual replacement by the mammals, to the appearance of man and the development of his civilizations, to total wars and the release of atomic energy.

Between the coming forth of the fish and even the first of these later refinements, however, 150 millions of years were to elapse. During this immense stretch of time, the world was to witness the rise and differentiation of the amphibians that were the descendants of the lobe-finned fish and the early radiation of the reptiles that were, in their turn, the descendants and later on the supplanters of the amphibians.

To many students of the subject, this is the most fascinating period of vertebrate evolution. Heretofore, because of lack of specimens, the Museum has not been able to present it satisfactorily to the public. This deficiency has now been overcome, thanks to one of the most munificent gifts in the history of the institution. Since the 1890s, the University of Chicago has been pursuing an active program of collecting, research, and exhibition in vertebrate paleontology, largely concentrating its efforts on the faunas of Permian and Triassic age. These two periods, marking, respectively, the close of the Paleozoic era and the opening of the Mesozoic, saw the final flowering of the amphibians and much of the rise of the reptiles. The collection, one of the finest of its kind in existence, that has resulted from this work has been presented by the University to the Museum. Merely to enumerate and comment briefly on all of the groups represented would require an article several times the length of this one. Space permits mention here of only a few, leaving more detailed discussions for the future.

LARGE SPECIMENS PRESENT MOVING-DAY DIFFICULTIES

Minor injuries to ancient skeletons suffered during transportation of the fossils from the University of Chicago to the Museum are repaired by Preparator Stanley J. Kuczek (left) and Chief Preparator Orville L. Gilpin. The specimen in the background is a dicynodont; the other two are pareiasaurs.

MODERN RELATIVES OVERSHADOWED

The amphibians of today—the well-known frogs, toads, and salamanders and the unfamiliar caecilians—convey almost no idea of the group in its heyday. From the later Devonian until well into the Pennsylvanian period, they were the dominant, indeed for most of that time the only, land vertebrates, and they were still abundant during the early Permian. A great number of diverse forms arose, the largest of which attained the size of crocodiles. The most important and best-known group had solidly roofed skulls and teeth with peculiar labyrinthine infoldings of the enamel, both characters inherited from the ancestral fishes. The large and ungainly *Eryops*, the smaller but even more clumsy-looking *Cacops*, and *Trematops* are early Permian types represented in the collection by mounted skeletons.

The present-day frogs and toads are now believed to be modified, in many ways degenerate, descendants of this labyrinthine-toothed division. A member of another group of amphibians is the extraordinary *Diplocaulus*, an aquatic form with greatly reduced limbs and a skull that could almost be described as boomerang-shaped. Although they pioneered in the invasion of the land, the amphibians never completely conquered it. Professor Alfred S. Romer has aptly remarked that in the water they are born; to the water they must periodically return. They never succeeded, as a whole, in evolving an egg that could be laid on land, left to develop there, and from which there would hatch a small but fully formed replica of the adult. In a restricted sense, however, they did accomplish this feat, for the labyrinthine-toothed amphibians gave rise to the reptiles that took this last, decisive step to true land life.

The division between reptile and amphibian, so sharp today, was by no means clear-cut in the late Paleozoic. It is a matter of discussion whether a certain group, typified by an animal called *Seymouria*, should be referred to the one class or the other, and quite possible that the more or less arbitrary dividing line between the two may have been crossed more than once. Be this as it may, reptilian diversity was rapidly attained, and by Permian time a great variety of forms was in existence.

Included in the collection are skeletons of the primitive *Labidosaurus*, of the little *Captorhinus* (a suite of whose remains from a fissure filling are almost perfectly preserved), of the lumbering pareiasaur *Bradysaurus*, and of various pelycosaurs. These last are of extreme interest, not only because they were on the line that was to lead to the mammals but also because of the extraordinary structure attained by two of the latest representatives of the order. *Dimetrodon* and *Edaphosaurus*, the forms in question, were characterized by immensely long dorsal spines on the trunk vertebrae that were joined together in life by skin. What function, if any, was served by these "sails" is wholly conjectural. In the edaphosaurs and their relatives of the *Casea* group, furthermore, we have the first truly herbivorous land vertebrates.

FIRST TAPPING OF PLANT FOOD

Among the other early reptiles and the amphibians, the larger ate the smaller, the smaller the smallest, and the smallest in turn subsisted on insects and other invertebrates. Here was the first direct tapping by the backboned animals of the food supply afforded by the plant world, a resource that was to be used extensively by the later reptiles and even more so by

the mammals. The early Permian material in the collection comes mainly from Texas. The later Permian and early Triassic faunas are represented by specimens from the Karroo, that classic collecting ground in South Africa. Among them is a good series of the therapsid reptiles that were the descendants of the pelycosaurs and the ancestors of the mammals.

Although the groups mentioned constitute the most famous part of the University

TREMATOPS SKELETON

An early Permian labyrinthine-toothed amphibian that attained a length of about 30 inches.

collection, they are by no means all there is of it. A considerable amount of fossil fish material, including a notable series of American Paleozoic remains brought together by the late Mr. William F. E. Gurley, will aid materially in filling a long-felt gap in the Museum's collection. The fossil mammals, mostly from the White River Oligocene of the Great Plains, supplement rather than complement those already in the Museum, but they are nevertheless a most welcome addition. Almost as if eventual union had been foreseen, the Museum and the University concentrated their field work in deposits of different ages, the University working chiefly in the late Paleozoic and early Mesozoic, the Museum in the late Mesozoic and the Cenozoic. Fusion has thus gone far toward filling the gaps in each.

The University collection began in a modest way with the collecting activities of the late Professor Georg Baur, who, as a young man, had come to this country from Munich to work with Professor O. C. Marsh of Yale, one of the founding fathers of American vertebrate paleontology. Baur was succeeded by the late Professor Samuel Wendell Williston, who had also served a term as assistant to Marsh. It was under Williston that the bulk of the Texas Permian material was acquired.

The tradition of Permian work was continued by Professor Romer, now of Harvard, and is being maintained by his successor, Dr. Everett C. Olson, the present incumbent of the chair and also Research Associate at the Museum. The late Mr. Paul C. Miller, formerly Curator of the University collection and one of the great collectors that America has produced, was associated with all but Baur. He personally collected and prepared most of the specimens and assembled every mounted skeleton. In a very real sense the collection is his monument.

BASIS OF MUCH RESEARCH

Material in the collection has been studied by these men, by their students, and by

SKELETON OF CACOPS

A large-headed amphibian, about 18 inches long, from the early Permian of Texas. The bony armor along the back presumably served for defense against larger predaceous forms.

other investigators and much has, in consequence, been published upon it. Because of this, the number of specimens that have been figured and described in the literature as well as of those that have served as the bases for descriptions of new species and higher taxonomic categories is large. It is upon this considerable volume of published work that the wide reputation of the collection largely rests. It may be said with considerable assurance that no discussion of the evolution of the early land vertebrates has appeared that has not been influenced either directly or indirectly by the knowledge gained from the specimens in it.

The gift of the collection does not mark the termination of the University's interest in vertebrate paleontology. It is, rather, a major step in a continuing integration of effort of the two institutions in this field. Both the University and the Museum are and will continue to be interested in furthering research and in collecting the specimens on which such work is based. The housing and care of the material falls, as is proper, to the lot of the Museum. In disseminating the knowledge gained, the two institutions address themselves in the main to different audiences in different ways—the University to its students by direct instruction and the Museum to the general public through the medium of exhibits. Both groups will benefit from the concentration of specimens.

Advanced classes in vertebrate paleontology have for several years been conducted in the Museum building. The advantage of the new arrangement to the students is obvious; no amount of listening to lectures or looking at published figures can supply the experience that is to be gained from first-hand examination of material. The Museum visitor can now see more of the grand sweep of vertebrate history. Access to the University collection was, to be sure, not denied him before; the specimens had been exhibited on the campus for many years, but, although they were known to specialists the world over, it is probable that hardly one Chicagoan in a thousand was aware of their existence.

Incorporation of material from the University collection into the Museum's exhibition series will of necessity take some time to accomplish. Pending the revision that this will entail, a number of skeletons of early amphibians and reptiles, including nearly all forms mentioned in this article, are being placed on temporary exhibition in Ernest R. Graham Hall (Hall 38).

ARKANSAS ZOOLOGY TRIP

On March 20, Mr. Colin C. Sanborn, Curator of Mammals, left for Arkansas accompanied by Staff Taxidermist Frank C. Wonder and Señor Celestino Kalinowski, a Peruvian student at the Museum. They will be joined later by Mr. Rush Watkins, of Chicago.

This trip will be the "maiden voyage" of the new Chevrolet Carry-all recently purchased by the Museum for zoological field work. Collecting of mammals, reptiles, and plants will be carried on near Marcella in the Arkansan Ozarks. This is the second of a series of field trips to collect and study the mammals of Arkansas.

THIS MONTH'S COVER

"For, lo! the winter is past, the rain is over and gone; the flowers appear on the earth; the time of the singing of birds is come, and the voice of the turtle is heard in our land." (THE SONG OF SOLOMON II, 11, 12)

Our cover picture shows part of a habitat group—Illinois Woodland, Chicago Area, in Spring—in Martin A. and Carrie Ryerson Hall (Plant Life, Hall 29).

Trees shown in the exhibit include sugar maple, American elm, linden, white oak, witch hazel, black cherry, and pale dogwood. Among the flowers seen are white and pink trilliums, dogtooth violets, Virginia bluebells, wild ginger, columbines, Jack-in-the-pulpits, Solomon's seals, and blue, yellow, and spurred violets.

The group was prepared in the Department of Botany's plant reproduction laboratories under the supervision of Curator of Exhibits Emil Sella. The background is by Staff Artist Arthur G. Rueckert.

BIRDS ARE WHERE YOU FIND THEM—IF LUCK IS WITH YOU

By AUSTIN L. RAND
CURATOR OF BIRDS

"BANG! Bang!" and two birds fell from the leafy canopy of the tropical forest to land at the feet of the young naturalist. He dropped his gun to pick up and hold a bird in each hand.

They were breath-takingly beautiful and strange to him. He'd studied the birds he'd expected to find in this jungle when he was back in the Museum, but he'd seen none like these. There certainly were none like them in the Museum. Perhaps they were new; perhaps the ornithologist back at the Museum would name them for him; perhaps, if he proved helpful and apt when he got back home, he could have a part in describing them. This was his first day of collecting, and it was an auspicious beginning. He thought of the time ahead, of the route he'd planned while poring over maps and specimens, and of the treasures he'd have to take back if collecting continued like this—treasures that would make his expedition a notable success.

ALONE, WITH WORK, IN A CLOUD FOREST OF GUATEMALA

Museum camp on slopes of Mount Tajumulco, altitude about 7,500 feet. At this camp, on an expedition sponsored by Leon Mandel, Associate Curator Emmet R. Blake, shown here at work, collected the specimens for the beautiful quetzal group now in Hall 20.

A CONTINUING TASK

That afternoon, as he skinned his birds and made them into study skins for the Museum collection, he thought of the part he was playing in the building of the bird collection at the institution and of the part others had played and still had to play. Expeditions, he knew, had been an important factor in building up the bird collections of Chicago Natural History Museum. Expeditions with Museum collectors had traveled to far corners of the earth, to make their camps in the jungles, on the plains, in the mountains, and on board ship amongst oceanic islands, and he saw himself, perhaps for the first time, really playing his part in the whole scheme. Before he had left Chicago, the ornithologist had talked at length with him about collecting and the Museum's bird collection.

The ideal way to get specimens for study is to go out and collect them yourself. But you wouldn't live long enough for that, nor do you have enough alter egos. So expeditions sent from the Museum are the next best solution. The ornithologist knows from his studies the areas that have not been explored; he knows what sort of things are needed. So he sends out the young student with his equipment, a modicum of funds, a map, a list of rarities that he wants especially (mostly quite unobtainable), and instructions to get a complete representation of all the birds in the area in series large enough to be useful, not forgetting herons, ducks, hawks, and hornbills (i.e., those that are big, hard to skin, and smelly, and whose skins are difficult to dry and pack).

The young collector must not forget the common birds of the native village where he has made his headquarters, for some may be seen nowhere else, though it's necessary to be careful about natives' prejudices, for the natives may not want guns fired in their villages. He will have had strict instructions about labeling (a label without a specimen can be valuable; a specimen without a label isn't worth much), and on note-taking. His notes should include information as to where and how each bird lives, a description of the country and of the routes used, and observations on travel conditions and anything else that may be of value in writing up a report. As the specimens begin to come in to the Museum, the ornithologist will have sent back encouraging letters to the young collector, suggesting improvements in labeling and preparation, commenting on the material and its value, pointing out things lacking, and congratulating him on the rarities he has found and on his good series.

DUGOUTS, DISASTER, DESPAIR

Transportation is by whatever means come to hand, and some Museum expedition journals, between entries for the detailed description of the song of a brown-tailed scrub-bird, long lists of provisions, and itineraries, may read like first-rate escape adventure literature. Take the 1938 British Guiana trip of Emmet R. Blake, Associate Curator of Birds. He went into the Brazilian frontier country, a region of rugged mountains, rushing streams, and trackless jungles avoided even by aborigines. He flew in from Georgetown and landed on a river base; then he relayed his goods upstream by a 32-foot power boat and later by dugout canoes. In October, with the start of the dry season, falling water level threatened to leave him stranded and so he hurried downstream. Rapids presented real dangers, and one of these materialized. The motorboat hit a rock in midstream, leaving the outfit stranded, the gear gone, and half the specimens lost. Crude craft were improvised—a "bateau" from canvas and planks and a "woodskin" boat from the bark of a "purple heart" tree—and in these and some dugouts the expedition members paddled back to civilization. They were safe, but the loss of half their collections, half the results of a year's work into which had gone thought, effort, long hours, and a man's whole heart—material that was irreplaceable—was a catastrophe beyond portrayal in words.

Melvin A. Traylor, Jr., Associate in the Division of Birds, on a trip to Yucatan traveled and worked in company with an archaeologist, Bill Andrews. While Andrews pored over ancient inscriptions, transcribing hieroglyphics, Traylor collected birds on the plaza where in bygone days Mayan Indians conducted religious ceremonies. Our collectors have worked widely: in South America Blake has made several trips to British Guiana, and Rudyerd Boulton, former Curator of Birds, made a wonderful study on Mt. Cameroon in West Africa; the late Dr. Wilfred H. Osgood, former Chief Curator of Zoology, with the late Louis Agassiz Fuertes, noted artist, and Alfred M. Bailey, then a member of our Department of Zoology and now Director of the Colorado Museum of Natural History, Denver, got a beautiful collection from

northern Abyssinia. Josselyn Van Tyne, now of the University of Michigan, worked for us in Indo-China; Boardman Conover, Trustee of the Museum and Research Associate in the Division of Birds, and John T. Zimmer, former Curator of Birds, collected in East Africa. The history of the collection during the early years of the Museum is another and an interesting story.

CAMPS, COOKS, AND CONTACTS

There's more to collecting than shooting birds. There's choosing the right places to camp and staying there until the area's exhausted, that is, until days go by without getting any new birds. There's the camp to set up and manage, the kitchen to run, and the food to supply to the cook. There's the water to boil. Contacts must be made with the local people and transport arranged. The getting of birds starts another train of responsibility, too. There's the preparing of them. If native help is available, use it. Natives can be taught to skin large birds, and as skill develops they can graduate to small ones. That can double or treble your productivity. The specimens have to be dried, perhaps over a kerosene lamp (but avoid a smoky fire, which turns specimens brown), then packed, and got somehow to the coast, to be put aboard a steamer, after which the collector can be reasonably sure they'll get to Chicago—unless, that is, the ship catches fire or they're damaged by water, and that's beyond him.

Native aid in getting birds is important, especially for obscure or shy ground birds and those of dense grass and marsh that the natives can snare or shoot with their bows or their blow-guns. Sometimes a little crake may be common. Its call rings daily from a grassy meadow near the skinning table but rarely is one glimpsed. In such a case the native is invaluable. He knows where the birds run. He sets his little fiber snares, and for a few cents worth of trade goods in beads, face paint, seashells, or trinkets, you may soon have a whole series brought in. A native gunboy, provided with a shotgun and a ration of a few shells daily is also a good investment.

The good collector is astir betimes. He's up and active with the sun. He tries to get back to camp before noon so as to have lots of time to prepare his specimens. But even so, his enthusiasm may have spurred him on to gather so much material that the last of it has to be prepared by the light of a lamp, after dark. And then there's the writing up of notes, records that are as important as the specimens for any well-run expedition. By the time he's finished, he's ready for bed. But every night can't be spent in bed, if he's to get a complete collection of birds, for it's at night that some birds, like the owls and goatsuckers, are abroad. So some days as darkness falls he takes his gun and jacklight and prowls the jungle trails, watching for animal eyes to shine in the rays of his light. Only the eyes are visible in the beam of the torch, and he shoots at them. It's perhaps the most exciting kind of hunting, for often he doesn't know what kind of an animal the eyes belong to until after he's gone over and picked it up. It may be a goatsucker he's not seen before; it may be some rare mammal that he'll save even though mammals are a sideline in his interests; or it may be only a spider, for spider eyes shine brilliantly. In some marshy bogs the rays of his torch may reveal many pairs of reddish eyes at the water's edge, the eyes of young alligators. Owls' eyes don't shine well and so he has to watch closely. But a word of caution. Near settlements make sure that large, luminous eyes don't belong to someone's horse or cow!

Sometimes it seems impossible to get a specimen of a particular species of bird that's seen almost daily. Sometimes it's an eagle that soars high over the jungle, never coming within range. But be eternally vigilant, and some day you'll find one off guard. Osgood had trouble getting a good specimen of the rare and elusive green peacock in Indo-China. The birds were feeding in the old rice fields and meadows but always far from good cover and so alert as to defy stalking. But by watching the birds he

(*Turn to page 8, column 1*)

ADDITIONS TO EXHIBITS OF THE PLANT KINGDOM

By THEODOR JUST
CHIEF CURATOR, DEPARTMENT OF BOTANY

Two new models of plants belonging to widely separated groups have recently been added to the synoptical exhibits of the Plant Kingdom on display in Martin A. and Carrie Ryerson Hall (Hall 29, Plant Life).

DESERT GLORY

This reproduction of Echeveria gibbiflora, native of Mexican deserts, has recently been added to the exhibits in Hall 29 (Hall of Plant Life).

The genus Echeveria includes some of the most beautiful succulent plants known. Named in honor of the Mexican botanical artist, Atanasio Echevarria, its species number more than 100 and range in the deserts from Texas to northern South America.

Highly variable in leaf shape and color, their leaves may be dark or quite pallid, sometimes frilled. The species represented, gibbous-flowered Echeveria, is a native of Mexico, where it generally attains a height of 3 to 4 feet in flower and 12 or more inches in diameter. The flowers are conspicuous because of their rose-colored petals and the leaf-like bracts.

The genus Echeveria belongs to the stonecrop family, which contains some 600 species of fleshy or succulent plants, most of which are small like the stonecrop, live-for-ever, etc. Echeverias are great favorites for greenhouse cultivation and can easily be hybridized.

The model, prepared from a live specimen by Preparators Frank Boryca and Milton Copulos, with the assistance of Mr. Emil Sella, Curator of Exhibits, is on display in Case 849.

The other model is a reproduction of a remarkable representative of the class known as blue-green algae. It is a species of Nostoc (*Nostoc amplissimum*) common in cold fresh-water ponds and streams of the western United States. The large gelatinous balls of this species are olive-green or brownish and may attain a size of 60 by 30 centimeters, whereas those of other species are usually marble-sized or slightly larger, as is evident from a comparison with another exhibit in the same case (803).

Nostocs are really made up of innumerable microscopic filaments densely interwoven and embedded in a gelatinous matrix. The structure of these filaments can be seen in the glass model in Case 801. This model also gives an indication of the blue-green color characteristic of these plants. Normally nostocs grow in water or on wet soil or rocks. The specimens used for this exhibit were collected on the bottom of a very cold pond about 12 to 24 inches deep near Klamath Lake, Oregon. The models were made by Mr. Sella.

Chicago Natural History Museum

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Members are requested to inform the Museum promptly of changes of address.

STAFF NOTES

Dr. Alexander Spoehr, Curator of Oceanic Ethnology, has been granted leave of absence for next summer to teach anthropology at Harvard University. Currently, he is engaged in research at museums and libraries in Washington, New York, and New Haven in connection with collections made on his recent expedition to Micronesia. . . . **Dr. Paul S. Martin,** Chief Curator of Anthropology, **Mr. Donald Collier,** Curator of South American Ethnology and Archaeology, **Mr. George I. Quimby,** Curator of Exhibits, and Dr. Spoehr all have recently lectured before anthropology classes at the University of Chicago. . . . **Dr. Hugh C. Cutler,** Curator of Economic Botany, gave a seminar, "Diversity in Useful Plants of Bolivia," at the Missouri Botanical Garden, St. Louis, last month. He and Mr. Collier together participated in a recent "Flying Reporter" radio program over WAIT, telling of their expeditionary activities. . . . **Dr. Theodor Just,** Chief Curator of Botany, gave a seminar at the University of Chicago on "Hartmann's Theory of Sexuality." . . . **Mr. Colin Campbell Sanborn,** Curator of Mammals, has been elected a Corresponding Member of the Zoological Society of London. . . . **Mr. Karl P. Schmidt,** Chief Curator of Zoology, attended a recent meeting of the American Society of Icthyologists and Herpetologists in New Orleans. . . . **Dr. Julian A. Steyermark,** Associate Curator of the Herbarium, has been appointed Honorary Research Associate of the Missouri Botanical Garden, St. Louis.

CUBA BOTANICAL EXPEDITION

Dr. B. E. Dahlgren, Curator Emeritus of Botany, and Dr. Hugh C. Cutler, Curator of Economic Botany, have returned from an expedition to Cuba where they studied and collected palms.

Although palms provide food, shelter, and clothing for many people in the tropics, little is known about the habits of palms and of the relationship between the various kinds. The date and coconut palms have been studied slightly, but no thorough investigation has been made of the lesser known palms, many of which, like the babassú palm of Brazil, continued to provide essential supplies of oil when the Oriental sources were cut off by the Japanese during the war.

During the survey of the palms of Cuba, material was collected for the exhibits and herbarium of the Museum.

Guatemala Zoological Expedition

The Museum's Guatemala Zoological Expedition, 1948, will leave on April 8 for four and one-half months work in the field. The main purpose of the expedition is to collect certain insects that were described in the monumental publication, *Biologia Centrali-Americana,* and that have since presented many problems in classification, and to collect mammals and their ectoparasites. Work will center chiefly around the Volcan Fuego and the Volcan Agua, the Sierra de las Minas, and the caves in the Lanquin area. The party consists of two entomologists, Mr. Rupert L. Wenzel, Assistant Curator of Insects, and Mr. Rodger D. Mitchell, of Wayne, Illinois, and a mammalogist, Mr. Luis de la Torre, of Highland Park, Illinois.

'Children's Corner' on Radio Features Museum Stories

Museum stories on natural history, supplied through the co-operation of the James Nelson and Anna Louise Raymond Foundation for Public School and Children's Lectures, are currently being featured as part of the program called "The Children's Corner." The program is presented each Saturday on Station WCFL at 5:15 P.M. and again each Sunday morning at 9 A.M.

Museum Aids Surgery Class

On February 12 and March 9 a group of twenty-four plastic surgeons taking advanced graduate work at the University of Illinois Medical School visited the Museum for a special demonstration by Mr. John Pletinckx, Ceramic Restorer in the Department of Anthropology, of plaster casting.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

ESPECIALLY FOR CHILDREN—

PANUCK, ESKIMO SLED DOG. By Frederick Machetanz. Charles Scribner's Sons, New York. 95 pages, illustrations by author. Price $1.75.

This is the story of an Alaskan Eskimo boy and his dog. The Eskimo boy, Andy, raises his puppy, Panuck, to be a sled dog. With his own sled and dog team with Panuck as lead dog, Andy has adventures, one of which is particularly exciting and proves the abilities of the boy and his dog team. The story is laid against a background of modern Eskimo life in Alaska. The duration of the story, four seasons, enables the author to show modern Alaskan Eskimo life in spring, summer, autumn, and winter.

The text is abundantly supplemented with excellent illustrations by the author. These are not only entertaining but also instructive. There are, for instance, drawings showing the form and construction of sleds and the style and method of harnessing dogs.

GEORGE I. QUIMBY
Curator of Exhibits, Anthropology

GIFTS TO THE MUSEUM

Department of Botany:

From: Dr. Walter Kiener, Lincoln, Neb.—180 specimens of algae, Nebraska; Dr. Ramón Ferreyra, Lima, Peru—29 specimens of algae, Peru; Dr. E. Yale Dawson, Los Angeles—90 specimens of algae, Mexico, Costa Rica, and Galapagos Islands; Herman Silva, East Lansing, Mich.—192 specimens of algae, Tennessee and North Carolina; Facultad Nacional de Agronomía, Medellín, Colombia—342 herbarium specimens, Colombia.

Department of Zoology:

From: John Q. Burch, Los Angeles—2 specimens of sea shells, West Mexico; Mrs. Dorothy Foss, Chicago—a golden hamster; Rupert L. Wenzel, Oak Park, Ill.—404 specimens of insects and allies, Tennessee and Georgia; Hugh B. Leech, San Francisco—2 beetles, British Colombia; Smithsonian Institution, Washington, D.C.—a freshwater snail, Philippine Islands; Lincoln Park Zoo, Chicago—a hutia (Plagiodontia), Haiti; Chicago Zoological Society, Brookfield, Ill.—19 birds and a male drill; Bro. Niceforo Maria, Cucuta, Colombia—a turtle; Miss Dawn Davey, Chicago—22 specimens of sea shells, Florida; Claudio Ciferri, Caracas, Venezuela—6 birdskins, Venezuela.

Library:

From: Caribbean Research Council, Caribbean Commission, Washington, D.C.; Col. Clifford C. Gregg, Valparaiso, Ind.; Dr. Fritz Haas and Rupert L. Wenzel, Chicago.

SATURDAY LECTURES ALL THROUGH APRIL

The Museum's spring course of free illustrated lectures on Saturday afternoons will continue through April. All lectures begin at 2:30 P.M. in the James Simpson Theatre. They are restricted to adults.

The remaining lectures are:

April 3—SEEGOORUK
Frederick Machetanz

April 10—WORLD BELOW THE WAVES
Vincent Palmer

April 17—DESERT GOLD
Peter Koch

April 24—LIFE AMONG THE PRIMITIVE FUEGIANS
Col. Charles Wellington Furlong

No tickets are necessary for admission to these lectures. A section of the Theatre is reserved for Members of the Museum, each of whom is entitled to two reserved seats. Requests should be made in advance by telephone (WABash 9410) or in writing.

LECTURE TOURS IN APRIL, DAILY EXCEPT SUNDAYS

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays (the Friday tours open with an introductory lecture and slides or films in the Meeting Room on the second floor of the Museum); a schedule of these follows:

Fri., Apr. 2—The Wandering Navaho. Illustrated introduction in Meeting Room (*June Buchwald*).

Wed., Apr. 7—Spring in the Animal World (*Lorain Farmer*).

Fri., Apr. 9—Spring Song Birds. Illustrated introduction in Meeting Room (*Winona Cosner*).

Wed., Apr. 14—Indian America (Pan-American Day) (*Harriet Smith*).

Fri., Apr. 16—Medicine Men—Primitive Medical and Dental Practices. Illustrated introduction in Meeting Room (*Marie Svoboda*).

Wed., Apr. 21—Spring in the Woodlands—The Earliest Flowers, Leaves, Birds, and Reptiles (*Miriam Wood*).

Fri., Apr. 23—Adapt or Become Extinct! Illustrated introduction in Meeting Room (*Jane Sharpe*).

Wed., Apr. 28—Buried Treasure—Story of Gems (*Winona Cosner*).

Fri., Apr. 30—Snake Stories. Illustrated introduction in Meeting Room (*Lorain Farmer*).

DEEP-SEA EXPEDITION PREPARATIONS UNDER WAY

Most of the equipment for the Bermuda Deep-Sea Expedition, 1948, a joint project of Chicago Natural History Museum and the Bermuda Biological Station for Research, Inc., will be dispatched in April to the expedition headquarters at St. George's in the Bermuda Islands on the *Caryn*, the ship assigned to the expedition.

The *Caryn* is currently engaged in oceanographic research for the Woods Hole Oceanographic Institution in Massachusetts. When her present mission is completed, the *Caryn* will go to Bermuda for the joint operation by the Bermuda Station and Chicago Museum. She is to be ready for the beginning of actual work on the Museum expedition in June.

The *Caryn*, shown in the accompanying illustration, is a 98-foot auxiliary ketch especially designed and equipped for marine research, manned with a full crew of professional navigators and seamen. Members of the staffs at both the Chicago Museum and the Bermuda Biological Station are at present busy with preparations for the expedition, which will be at sea during June, July, and August.

Dr. Dugald E. S. Brown, director of the Bermuda organization, and members of his staff will conduct certain phases of the work. The Chicago Museum's party on the expedition will be led by Dr. Fritz Haas, Curator of Lower Invertebrates, with the aid of Mr. Loren P. Woods, Curator of Fishes, who will join the expedition for the initial three weeks. A number of other members of the Museum staff will be included in the expedition personnel.

In a preliminary announcement of the Bermuda Deep-Sea Expedition in the February BULLETIN, the Marine Biological Laboratory at Woods Hole was erroneously named in connection with the Oceanographic Institution. The Laboratory is a sister organization but has no official connection with the Oceanographic Institution.

Photo courtesy Woods Hole Oceanographic Institution

THE 'CARYN,' EXPEDITION SHIP, AT HER DOCK AT WOODS HOLE, MASSACHUSETTS

Progress of Pacific Expedition

The Palau Entomological Expedition, which entered the field in October last year, has transferred its insect-collecting activities from Palau Island to Ponape, the largest of the Caroline Islands in the central Pacific, it is reported by Mr. Henry Dybas, Assistant Curator of Insects, who is in charge.

NEW MEMBERS

The following persons became Museum Members between Feb. 16 and March 15:

Associate Members

Carl A. Erikson, Roger F. Howe, Franklin J. Lunding, Mrs. Norman G. Parry, Dr. Eugene L. Walsh.

Sustaining Members

William Laing

Annual Members

Dr. Leo Amtman, George S. Bartlett, Daniel L. Benton, James F. Cech, A. B. Dunwody, R. J. Durham, G. Howard Fisher, Maurice Fisher, Dr. Townsend B. Friedman, Joseph Goder, William Grage, C. R. Hickey, Leon J. Ketcham, Dr. John A. Kollar, Jr., W. A. Kuechenberg, A. W. Lavers, Dr. Richard A. Lifvendahl, Francis E. Luthmers, Dr. Eugene F. Lutterbeck, Verne O. McClurg, Albert E. McKee, A. S. Nabat, Dr. F. E. Norman, Mrs. Hedwig Norman, Leo T. Norville, Jay G. Odell, Joseph R. Odell, Paul V. Pallasch, Mrs. Ben Regan, Reuben M. Schutz, George F. Stahmer, II.

Easter Bonnet . . .

MUSEUM PHOTO A WINNER IN PUBLICITY CONTEST

Courtesy Chicago Daily News

The accompanying picture, entitled "Easter Bonnet—Primitive Style," made in carrying out a project of the Museum's Division of Public Relations and published in "News-Views," rotogravure section of the *Chicago Daily News*, last month was winner of an award in the Feature Section of "Pictures With A Purpose," the first publicity picture competition and exhibition sponsored by the Publicity Club of Chicago. Mr. H. B. Harte, Museum Public Relations Counsel, is a charter member of the club, which was founded in 1941.

The picture was made by Mr. Emmet Barden, staff photographer of the *Chicago Daily News*. The girl, Miss Pauline Pfeffer of the Patricia Stevens model studios, is shown wearing as a hat a mask from New Ireland in the South Pacific, regarded as a no more startling item of millinery than some of the "creations" worn by women in this country and Europe, especially around the Easter period. When published in the *Daily News*, the picture was used with a series of other primitive headgear from various parts of the world.

Special Atomic Exhibit Continues

The atomic energy "photographic essay," prepared by *Life* Magazine, which opened last month in Stanley Field Hall, will continue on exhibition until April 9.

MOVIES FOR CHILDREN SATURDAY MORNINGS

The spring series of free motion picture programs for children on Saturday mornings, presented by the James Nelson and Anna Louise Raymond Foundation, will continue through April 24. The programs are given in the James Simpson Theatre of the Museum, and all begin at 10:30 A.M.

Following is an outline of the programs:

April 3—ESKIMO SUMMER (Color Movies)
Lecture by Frederick Machetanz

April 10—GLIMPSES OF AUSTRALIA
Also a cartoon

April 17—BEAUTY IN THE BIG BEND COUNTRY (Color Movies)
Lecture by Peter Koch

April 24—MY DOG SHEP

PERU BOTANICAL EXPEDITION

The Desloge Peruvian Botanical Expedition, 1948, left March 31 for South America to study the history of cultivated plants in Peru and Bolivia. There, in the central Andes, is the center of origin of many important American food plants, such as corn, potatoes, and tomatoes.

The three members of this expedition, Dr. Hugh C. Cutler, Curator of Economic Botany at the Museum, and Mr. Joseph Desloge and Mr. Arthur Hoskins, of the St. Louis Academy of Science, will secure information and specimens for exhibits of the more important indigenous New World plants before these have disappeared. Mr. Desloge, sponsor of the expedition, was recently elected to the roll of Contributors to this Museum.

BIRDS ARE WHERE YOU FIND THEM

(*Continued from page 5*)

found that if they were undisturbed, he could follow them at dark and find where they went to roost in tall trees and then, with care and luck, he could get a shot. But then he found that ordinary shot was not heavy enough to kill them, and he had to use buckshot. He got some females and young males that way, but the fine old male, now in the habitat group in Hall 20, he got by a fluke. He shot it from his motor car, beside the road, at the end of his stay in the country.

Sometimes, and these are times he remembers, the collector has searched far and wide, in jungle, by river, and over plain, for some rare bird that is supposed to be in the area, or that he hopes is there, without finding any trace of it. And then toward the end of his stay, returning tired and discouraged to camp, he finds that during his absence one of the prized individuals has ventured right into the camp and the cook boy has killed it with a stick.

The birds and the material for the habitat groups in Hall 20 were collected by expeditions. Special expeditions may be sent out for exhibition material but usually such collecting is combined with securing scientific material. In 1937 Blake went to South America, to collect specimens and accessories for two groups and to make general collections for study. He went to British Guiana where lives one of the most remarkable birds in the world, the hoactzin. This bird, amongst other things, is notable for having functional fingers on its wings. Its nests are usually over water in swamps, and when the young are disturbed they may dive into the water beneath and, later, when danger is past, clamber back into the nest. The hoactzin being one of his main objectives, Blake first located a colony near Georgetown and, employing natives to help him, he obtained the birds, their nests, samples of plants, and photographs and plans so that the Museum might have, in a habitat group, a faithful reproduction of a nesting hoactzin colony of Canje Creek, British Guiana. With this finished, Blake turned to collecting his research material. Camps were established on the river banks, in the mountain forests, and in the vast coastal plains.

The rainy season made field work in British Guiana impractical and Blake moved to Brazil where he could work more effectively. Amongst other things he wanted rheas and rheas' nests. Rheas are ostrich-like in appearance and the largest of American birds. They usually go in small flocks containing one male and several females. A nest may contain 25 to 50 eggs, each weighing one and one-half pounds. On this job, Blake spent about two months in the saddle, roaming the plains, often in company with the picturesque Guarani Indians. After a year in the field, Blake returned to the Museum with wonderful collections of birds rare and new to the Museum as well as material for the two habitat groups. He had traveled in one year 16,000 miles, by rail, steamer, canoe, oxcart, and on horseback and afoot.

Bringing back live animals is usually impractical for a Museum expedition. The amount of care the captives need is usually far beyond what can be provided. But occasionally it can be done. When the Leon Mandel Expedition collectors were in the Galapagos, they were traveling on a private yacht. When live Galapagos penguins, albatrosses, frigate birds, and boobies were secured, there was space to house them, food and care could be provided, and they were brought back in good shape for Brookfield and other zoos.

(*Next month Dr. Rand will tell of collections obtained from sources other than official Museum expeditions.*)

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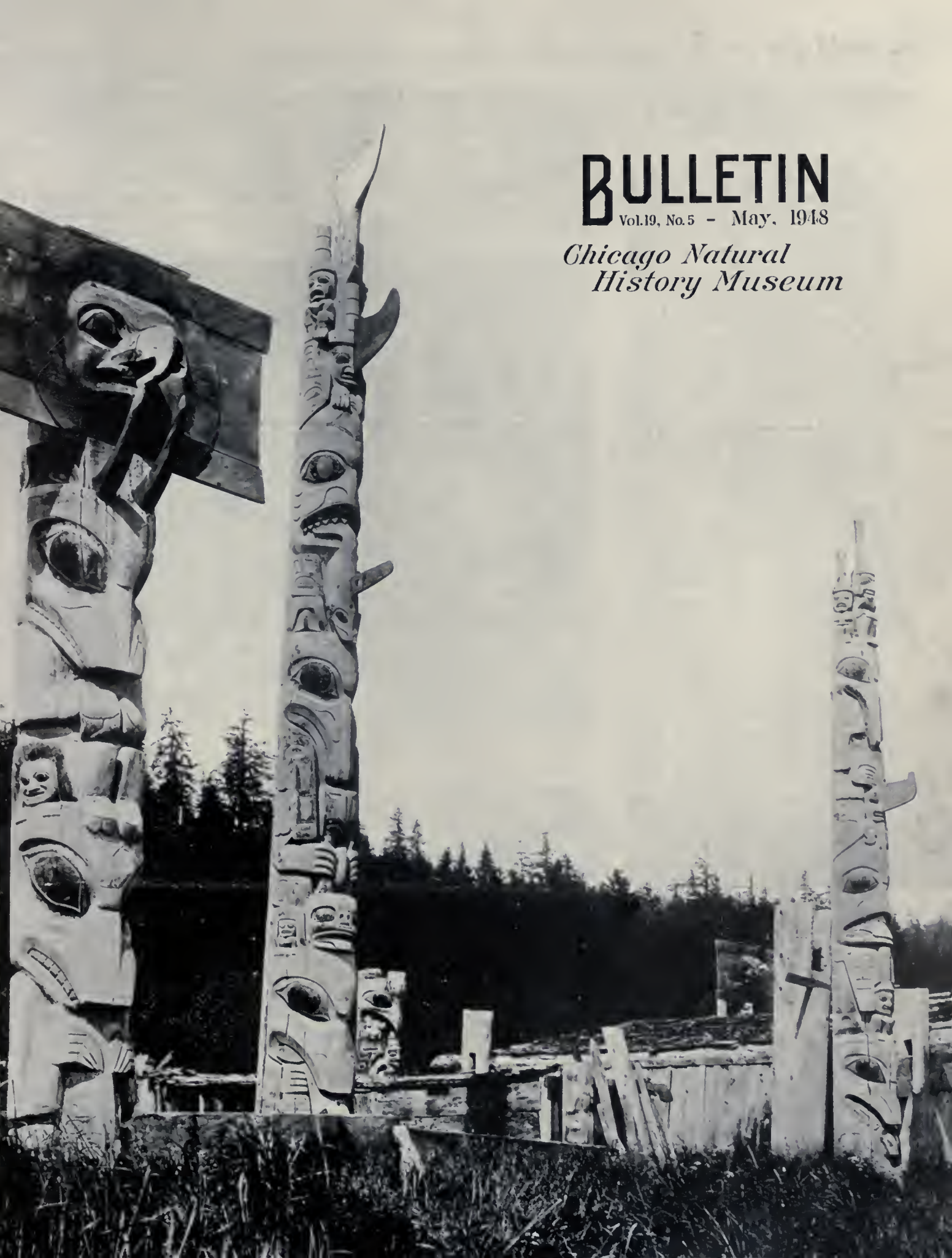

BULLETIN

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Chicago Natural History Museum

EXHIBIT TRACES GENEALOGY OF MAMMALS—INCLUDING MAN

By D. DWIGHT DAVIS
CURATOR OF VERTEBRATE ANATOMY

Chicago Natural History Museum has eight large halls devoted to the mammals of the world. Since man himself is one of the mammals, the many halls of anthropological exhibits could also be regarded as mammalian exhibits, and thus more than half of the total exhibits in the Museum deal with this group of animals. In nature, on the other hand, the mammals are among the least numerous of all animal groups.

A trip through these halls gives the interested visitor a graphic idea of the astonishing differences among the various mammals. He can scarcely fail to be impressed by the bigness of some and the littleness of others, by the array of horns, hoofs, claws, trunks, flippers, or of various degrees of hairiness or nakedness. The mammals seem to have gone off in all directions in adapting themselves to their varied ways of life.

Actually there is an order in this seeming chaos, but until recently there was nothing in the Museum to show how the thousands of different kinds of mammals are interrelated, like the various members of a human family. A "family tree" of mammals, now on view in George M. Pullman Hall (Hall 13) shows these relationships at a glance. Thus it serves as an introduction to the remaining exhibits of mammals.

EVOLUTION OF CLASSIFICATIONS

Zoologists, like many other people, are inveterate classifiers. The oldest historical records contain attempts to classify mammals from various standpoints, scientific and otherwise. One of the oldest and best known is the ancient Jewish classification of mammals into "clean" and "unclean" on the basis of foot structure and cud-chewing habits (Leviticus xi). Subsequent attempts to classify mammals, made by zoologists in various parts of the world, underwent a gradual evolution that reflects the growth of knowledge over the years. In 1910, Dr. W. K. Gregory, of the American Museum of Natural History, published an interesting history of these classifications, under the title *The Orders of Mammals*. The discovery of fossil mammals, many of them entirely different from any living mammal, first became an important factor in the 19th century and since then has been of constantly increasing importance in shaping our ideas of the classification of mammals.

Today zoologists recognize eighteen great groups, or *orders*, of living mammals and fourteen additional orders that flourished in the past but died out and are now known to us only as fossils. Some of the orders, such as the bats, the rodents, or the carnivores, contain thousands of species, are found everywhere, and are well known to everyone. Others, such as the colugos or the aardvarks, include only a couple of species, and the problem of their affinities has puzzled zoologists ever since they were first discovered.

MAN'S PLACE CHANGES

The question of man's position in the classification of mammals has had an interesting history. The oldest classifiers could not bring themselves to bracket man with the beasts of the field, and they omitted him entirely from their classifications. As scientific knowledge increased it became more and more apparent that man does not differ fundamentally from other mammals. Zoologists of the 18th and 19th centuries included man in their classifications, but they gave him a very special position. Usually a classification either began with man and worked down through the "lesser" mammals to the "lowest," or it began with the lowest and ended, on a note of triumph, with man at the top. But still further research showed that man and his relatives are most closely related to the insectivores (the moles and shrews), which in turn are among the most lowly of living mammals. The new Museum exhibit accordingly shows the line that leads to man coming off near that of the insectivores.

FURTHER MODIFICATION ANTICIPATED

Of course, there is no reason to believe that the classification now in use by zoologists is perfect. Further discoveries, especially of fossils as yet unknown, and further knowledge of mammals already known, will undoubtedly change our ideas of the interrelationships of mammals. Perhaps a century from now our present classification will look as crude and unscientific as the classifications of the older zoologists do to those of today.

MAN IS SHOWN AS ARISING FROM A LOWLY LINE

The family tree of living mammals was prepared by Museum Artist Joseph B. Krstolich, under the direction of Chief Curator of Zoology Karl P. Schmidt. A similar project for invertebrates is in process.

THIS MONTH'S COVER

This picture, from a negative made away back in 1883, shows totem poles and native houses in the old Haida Indian village of Skidegate on the Queen Charlotte Islands of British Columbia, Canada, as they appeared at that time. Totem poles, house posts, and many other objects of ethnological interest collected from the Haida Indians who formerly occupied this village are on exhibition in Hall 10 of the Museum's anthropological exhibits.

Science Plus Imagination . . .

THE PROBABLE COLORS OF PREHISTORIC BIRDS

By EMMET R. BLAKE
ASSOCIATE CURATOR OF BIRDS

Birdwatchers of today can broaden their experience and learn the distinctive characters of the earliest known species by visiting the exhibit of fossil birds in Hall 21. Plaster models and full-scale reproductions of primitive birds that inhabited the world millions

ARCHAEORNIS
Earliest known bird. It lived in Bavaria about 135 million years ago.

of years before man have been reinstalled with life-like colors that are believed to approximate the original appearance.

How can one determine the colors of birds known only from fossil remains? In the absence of feathers the researcher seeks a clue in the colors and patterns of surviving relatives of the prehistoric bird and thus tempers imagination with probability. The primitive characters retained by the young of modern birds sometimes suggest correlations, and others may be found in the habits of related species.

EARLIEST OF BIRDS

Archaeornis, the earliest known bird, lived in the cycad forests of Bavaria about 135 million years ago. Today no one can determine the color of its plumage with certainty, for no living bird resembles this primitive ancestor. Nevertheless, its reptile-like teeth, functional "fingers," and long-jointed tail, and the nature of its habitat, suggest that *Archaeornis* might well have been brightly colored like certain present-day tropical lizards. The Museum's model is colored blue and brown, after Gerhard Heilmann's famous illustration.

Somewhat less nebulous were the colors of *Icthyornis* and *Hesperornis*, beautifully adapted fish-eating birds that inhabited North American seas approximately 100 million years ago. Both species had teeth, but otherwise they resembled birds of certain existing families. We know from its fossil remains that *Icthyornis* was a bird of strong flight and tern-like structure; so it is reasonable to suppose that its plumage was also similar to that of its present-day counterpart. In like manner, the spotted plumage of immature grebes is a primitive character that offers a clue to the probable appearance of that flightless ancestor, *Hesperornis*, the most nearly aquatic of all known birds.

ACTUAL FEATHERS FOUND

Several terrestrial species of massive structure that became extinct millions of years ago during the Tertiary and Quaternary Periods are also reconstructed in Hall 21. Birds of this type are represented today by cassowaries, emus, and ostriches. Since existing relatives are predominantly gray, black, or drab brown, it is believed that their primitive ancestors were similarly camouflaged. Remains of the giant moa (*Dinornis*) of New Zealand, a fairly recent fossil, tend to support this theory. Feathers as well as bones of the moa have been found; so there can be little question as to the appearance of this form and its relatives.

Also exhibited in Hall 21 is a reconstruction of the famous Mauritius dodo. This strange bird became extinct in 1681, but several fragmentary specimens fortunately are preserved in museum collections. Dodos appear in many Flemish tapestries of the period, and paintings by contemporary artists indicate that the Mauritius Island species was a bird of considerable beauty.

HESPERORNIS
Completely flightless, it was the most nearly aquatic of all known birds.

The Museum's full-scale model is displayed with copies of early illustrations reproduced in color.

Meteorites Consumed in Passage

Most earth-bound meteorites are completely destroyed during their passage through the atmosphere, and fail to reach the ground. Those that actually strike were much larger when they reached the upper confines of the air than they were upon landing.

EXHIBIT OF STUDENT ART FROM MUSEUM CLASSES

An exhibition of pastels, drawings, and paintings by the students of the Art Institute Junior School will be featured at Chicago Natural History Museum from May 1 to 31. These students range in age from about eight to seventeen years. The work is done directly from the Museum exhibits, which constitute a wealth of information, source material, and inspiration. The young artists are given freedom to choose any subject, and it is interesting to note the variety of the subjects included in this particular exhibition.

The sketching of plant and animal forms in Museum exhibits, shown as they are in nature yet under what amounts virtually to studio conditions, is but part of the many advantages offered young art students. They also have the opportunity to discern and study the antecedents of many art forms in the extensive ethnological exhibits of the Museum, particularly those of South Seas and African cultures.

Some of the exhibited items are naturalistic representations of animals, plants, and other material found in the Museum; others are impressionistic in type following various modern trends but still having their inspiration or basic design originating from Museum material. The work is notable especially for the colorful treatment most of the children give to their productions.

The Museum provides a classroom in which the group assembles, and folding chairs for student use in exhibition halls. Other classes of the Art Institute also visit the Museum periodically as part of general course work for adult students toward degrees in art.

STAFF NOTES

Miss Margaret Bradbury has been appointed to a post as artist in the Department of Zoology. . . . **Mrs. Genevieve Highland** has been appointed as assistant to **Miss Lillian A. Ross**, Associate Editor of Scientific Publications. . . . The Sociedad Malacologica "Carlos de la Torre," Museo Poey, Universidad de la Habana, Cuba, has elected **Dr. Fritz Haas**, Curator of Lower Invertebrates, an honorary member.

Reptile Collecting in Texas

Mr. Karl P. Schmidt, Chief Curator of Zoology, is conducting a field trip in southwestern Texas to collect amphibians and reptiles. He is accompanied by Robert F. Inger, an assistant in the Division of Reptiles; Mr. Schmidt's son John is also a member of the party. While in the vicinity of San Antonio they plan to attend the spring meeting of the Texas Herpetological Society.

FOSSIL REPTILES' SPINY BACKS ARE A PUZZLE TO SCIENTISTS

By RAINER ZANGERL
CURATOR OF FOSSIL REPTILES

Among the reptiles known to occur in the famous Permian Red Beds of Texas (deposited some 230 million years ago), the pelycosaurs are probably the most striking creatures. Even a disinterested visitor to Ernest R. Graham Hall (Hall 38), where some skeletons of these animals are now exhibited, could hardly fail to be impressed by the uniquely grotesque appearance of their skeletons.

The main feature that makes some of these animals look almost unreal is the great elongation of the spinal processes of the vertebrae along the back. These spines are, save for their length, essentially like those of any other reptile, and, indeed, there are numerous pelycosaurs whose vertebral spines are of moderate length (*see small inset in illustration*). As would be expected, there is ample discussion in the technical literature regarding the possible function of the long spines in such genera as *Dimetrodon* (*on left in illustration*) and *Edaphosaurus* (*right*). In the former genus, the spines are relatively smooth; in the latter, they are provided with fairly strong side branches that look like blunt thorns along the shafts of the spines, thus simulating, in a remote way, the twigs of an antler.

SPINEBACKS OF PELYCOSAURS BAFFLE PALEONTOLOGISTS SEEKING A SATISFACTORY EXPLANATION

Whether the spines on these strange creatures of the early Pliocene period (about 230 million years ago) were for defense, camouflage, or possible use even as sails in navigation, remains an unanswered question. Specimen on left is Dimetrodon limbatus; right, Edaphosaurus boanerges; inset above, Ophiacodon retroversus. All were obtained in Texas fossil fields, and were included in the extensive collection of paleontological material recently presented to the Museum by the University of Chicago. They are now on exhibition in the Museum's Ernest R. Graham Hall (Hall 38—vertebrate paleontology).

ONCE HELD TO BE 'SAILS'

Since no contemporary vertebrate has spines like some of the more specialized pelycosaurs, it is not possible, by analogy, to suggest a probable explanation for their development. Earlier workers attempted to explain the presence of the spines functionally and some amusing theories were suggested. One states that the spines were connected by a membrane to form a sail that might have been used in navigation; another assumes the spines to be unconnected, the animal twisting its backbone in such a way that the spines would form a pincushion as protection against enemies; yet another theory stresses the possible similarity of appearance between the spines and the rushes in which the animals were concealed, thus attributing to the spines the role of camouflage equipment (forgetting that the animals would have been better concealed without the spines).

More recent authors agree that no possible function could be assigned to these spines that would compensate for the obvious disadvantage of their presence. Modern theories advanced to explain the development of the pelycosaur spines are much more sober than the early ones, suggesting an initial selective advantage in moderate spine elongation as a mechanism to strengthen the otherwise weak backbone. Over-development is thought to have possibly been associated (genetically linked) with other changes in the physiology and/or anatomy of the animals.

ONE PROBLEM SOLVED

There is one aspect of the pelycosaur spine problem that could be solved satisfactorily. It concerns the question as to whether the spines were connected by means of connecting tissue covered by tough skin or whether they stood as free rods on the backs of the animals. In one skeleton of a *Dimetrodon*, part of the backbone was found fully articulated in the rock. The spines were well preserved and lay in their natural position side by side. One of these spines was evidently broken while the animal was still alive, since both broken ends of the spine show bone formation of the type commonly seen in healing fractures. The two spine pieces, however, remained separate. This means that the upper end of the broken spine must have been held in place by a strong membrane.

The pelycosaurs are an old and primitive group of reptiles that has recently been reviewed in an extensive work by Professor A. S. Romer of Harvard University. Among the pelycosaurs, we must look for the stem line that leads to the mammal-like reptiles and finally to the mammals themselves.

Within the order Pelycosauria, there are three main lines of development whose best-known and advanced representatives are those illustrated herewith. The specimens are from the vast collection recently presented to the Museum by the University of Chicago (BULLETIN, April, 1948, page 2).

NEW MEMBERS

The following persons became Museum Members between March 16 and April 15:

Associate Members

Dr. Emelia J. Giryotas, Austin T. Graves

Annual Members

Mrs. Clarice Arnold, George Baldwin, Alex W. Block, Harlowe E. Bowes, Mrs. Robert C. Brandt, Dr. Andrew F. Bulfer, Thomas S. Bulger, Arthur A. Burrows, Lee B. Doddridge, R. Gregory Durham, William E. Durham, Philip E. Eddy, Mrs. Raymond Fisher, Ira I. Fisher, Charles C. Gaudio, Mrs. James A. Griffin, Jr., Gideon Haynes, Jr., John Thompson Haynes, Walter H. Hildebrand, Philip A. Hollar, Carl E. Hoppe, Dr. M. J. Kostrzewski, Seymour J. Laney, Conrad A. Lindenmeyer, Dr. Maude L. Lindsey, Dr. Frank Lock, Archibald D. McKellar, Miss Marian Miller, Robert H. Miller, Mrs. Frank E. Nagel, Miss Gladys M. Scrimgeour, David I. Spark, Edmund Q. Sylvester, Dr. Emmy Sylvester, Paul F. Tevis, Edward M. Waller.

BIRDS FROM EVERYWHERE

By AUSTIN L. RAND
CURATOR OF BIRDS

(In "Birds Are Where You Find Them," published in last month's BULLETIN, Dr. Rand told of the collecting of birds by Museum expeditions. In the following article he tells of collections obtained from a variety of other sources also important in building up the Museum's resources.)

Many areas are represented in our collections, though we've had no expeditions there. For such regions our collecting has followed a different pattern. We shared in the Indo-China expeditions of Jean Delacour, research associate of the American Museum of Natural History, and our collections increased accordingly. Sometimes professional collectors finance their expeditions by selling their specimens. They love the travel, the exploration, the work, and the feeling of accomplishment. W. W. Brown collected in the West Indies for the late C. B. Cory in the 1890s and only last year the Museum purchased 300 bird skins from him.

Collectors don't care about selling the specimens, but they have to eat. From Bolivia our chief representation is due to a collection of 5,000 birds secured from Señor Francisco Steinbach of Cochabamba. He is continuing to collect the animals of Bolivia in the tradition established many years ago by his father, José Steinbach. Their efforts have enriched many of the museums of the world and made possible the present knowledge of the birds of their country. Herbert Stevens, who has collected in many out-of-the-way parts of the globe for various museums, got us a beautiful collection of birds from Sikkim in northern India; and Tangier Smith got us another from Szechwan—material that when worked up will add materially to our knowledge of the southern Himalayan fauna.

We have the magnificent Jackson collection from East Africa. It was collected over a period of twenty years while Sir Frederick Jackson was lieutenant governor of Kenya and governor of Uganda in East Africa. One of Sir Frederick's plans during his long and distinguished career in Africa was the writing of a treatise on the birds of East Africa, and to this end he recorded notes and observations and backed his records with specimens. Consequently this is an important collection for us, not only because it gives us representatives of many forms that we didn't have but also because it preserves the historic specimens used by Sir Frederick. The locality records in his volumes on *Birds of East Africa* are those on the specimens in our collection. We also acquired the magnificent Bishop Collection, one of the finest of private North American bird collections and the life-long labor of Dr. Louis B. Bishop. Such large private collections, of course, tend to find their permanent place in a research collection in a large museum.

Boardman Conover is building up a collection in the Museum of game birds that is one of the finest in the world. He has been in the field himself, from Alaska to South America and Africa, and through a wide correspondence with many people in many parts of the world he continues to fill in the remaining gaps.

CHANCE COLLECTIONS

Small collections add their quota, too; a missionary in northern India, or in Cameroon, may send a few but important specimens; a resident of South America sent us some important specimens from Paraguay; and a mammal collector's few skins, collected as a sideline, have yielded important additions like "Darwin's lost bird," collected by our Curator of Mammals, Colin C. Sanborn, a hundred years after Darwin's visit to Uruguay. A single specimen of a single species, or a specimen in a plumage that's needed for study may have a story behind it. Recently, Conover found we didn't have a downy young sea duck (*Thalassorius*) from Africa, but through correspondence with a chap in West Africa, he got one and that gap's filled.

By a great variety of methods and by a world-wide system of contacts, the collections of our Museum have been built up. We are on the way to having a representative collection of birds of the world. Our study collections permit us to produce exhaustive monographs on the birds of some regions. We're planning other expeditions to explore other regions for birds. On this material will be based further publications for the advancement of science and for popular publications as well as additions to our exhibits for the enlightenment of the public generally.

Museum-School Radio Programs

In co-operation with the Radio Council of the Chicago Public Schools, the James Nelson and Anna Louise Raymond Foundation will present two Museum radio programs for school children of the 5th and 6th grades in the Council's "Your Science Story-Teller Series." The first program will be on May 25 at 10:15 A.M. over stations WBEZ and WIND, and again at 1:30 P.M. over WBEZ only. On that program Mrs. Winona Cosner will be the guest speaker on the subject "Migration Mystery," pertaining to birds. On June 1, same stations and same hours, Miss Lorain Farmer will present "Some Strange Fish Stories." On the day following each of these programs, May 26 and June 2, at 1:30 P.M., follow-up lectures and demonstrations will be given at the Museum to groups of children sent from their schools.

A lot of things widely believed just are not so. Hear "Facts and Fallacies in Natural History," at the Museum, 2 P.M., May 14.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

ESPECIALLY FOR CHILDREN—

ON ARCTIC ICE. By Frederick Machetanz. Charles Scribner's Sons, New York. 105 pages, illustrations by author. Price $2.

On Arctic Ice is an independent sequel to *Panuck, Eskimo Sled Dog.** Once again the adventures of Andy Nalook and his dog, Panuck, are laid against a background of modern Eskimo life in Alaska. This time, however, Andy goes farther north and spends the winter with a group of Arctic Eskimos. In the far north Andy has many exciting adventures. Items of ethnological interest are the reindeer-herding Eskimos visited by Andy on his journey northward, the breathing hole and stalking methods of hunting seals from the ice, ice fishing, walrus hunting, and whale hunting. The book is a good introduction to the ethnology of modern Alaskan Eskimos.

The illustrations by the author are aesthetically pleasing and informative. There is much in this book to interest adults, although it was written primarily for young people.

GEORGE I. QUIMBY
Curator of Exhibits, Anthropology

* Reviewed in April BULLETIN.

Technical Publications Issued

The following technical publications were recently issued by Chicago Natural History Museum:

Fieldiana: Zoology, Vol. 32, No. 5. *Preliminary Survey of the Amphibians of the Riukiu Islands.* By Robert F. Inger. Dec. 8, 1947. 58 pages, 4 maps, and 2 text figures. $0.75.

Botanical Series, Vol. 23, No. 6. *Further Studies in the Genus Dodonaea.* By Earl Edward Sherff. Dec. 22, 1947. 52 pages. $0.75.

Botanical Series, Vol. 23, No. 7. *A Preliminary Study of Hawaiian Species of the Genus Rauvolfia. Additions to the Genera Scalesia and Hidalgoa.* By Earl Edward Sherff. Dec. 30, 1947. 18 pages. $0.25.

Fieldiana: Zoology, Vol. 32, No. 6. *Development and Growth of the Rattle of Rattlesnakes.* By Arnold A. Zimmermann and Clifford H. Pope. March 29, 1948. 62 pages, 25 illustrations. $0.75.

The facilities of the Museum Library are open to the public for reference reading.

Chicago Natural History Museum

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Members are requested to inform the Museum promptly of changes of address.

HARBINGERS OF SPRING

Many native plants mark the approach of spring. Depending, of course, upon what part of the United States we live in, harbingers of spring vary. For example, skunk cabbage, dweller of swamps and wet ground, is the first native herbaceous wild flower to appear in the Chicago region, but to the south of its natural range, in the eastern and north-central United States, it is replaced by other species.

Actually, the first wild flower to bloom in Illinois is the dainty little white-flowered, short-stemmed species of trillium, or wake-robin, known as snow trillium (*Trillium nivale*). It is quite rare in Illinois and is found only in a small number of counties in the central and northwestern parts of the state. However, if grown in the vicinity of Chicago, it emerges above the ground in March at the first indication of warm weather and rapidly produces its dainty white blossom. It is ahead of what is usually considered the first wild flower of the Chicago region, namely liverleaf or hepatica, though the skunk cabbage is actually the first native wild flower to bloom. Commonly both start to bloom about the middle of March or a little later. The delicate shades of pink, lavender, purple, orchid, and rose as well as the white petals of the hepatica are represented in two different species, *H. americana* and *H. acutiloba*. They are found in our rich woods, usually on gentle or steep slopes along streams.

Other early indicators of spring, found in southern or central Illinois and adjacent states but not occurring spontaneously as far north as Chicago, are the tiny, blue-flowered least bluets (*Houstonia minima*), not to be confused with other species of this genus in the Chicago region, Whitlow grass (*Draba brachycarpa*)—or its relative, introduced from Europe into the Chicago region, *Draba verna*, a tiny white-flowered plant—and mousetail (*Myosurus minimus*), a dwarf plant with slender upright leaves and a tail-like column supporting tiny greenish flowers. Although the name wake-robin, applied in general to species of trillium, might indicate that these plants are true heralds of spring, they flower, with the exception of the snow trillium mentioned above, much later than many other plants.

Some cultivated flowers, such as snow-drop (*Galanthus nivalis*), squill (*Scilla bifolia*), and species of crocus are early bloomers. Of these, the snow-drop is the first to flower. Although it often appears above ground with its single terminal nodding bell-shaped white blossom in early March, it may, in fact, blossom earlier than Chicago's first native wild flower, skunk cabbage.

One of the plants actually named "harbinger of spring" is a member of the carrot family called *Erigenia bulbosa*. It is also known as "salt and pepper" because the small clusters of flowers are in a black-and-white arrangement suggesting specks of salt and pepper. This plant, although not found in the immediate vicinity of Chicago, is commoner in the south-central and north-eastern states and is one of the first wild flowers to appear in those areas.

OZARK WITCH HAZEL

Among the woody plants, none flowers earlier than the Ozark witch hazel, *Hamamelis ozarkana*. It is found in the Ozark region of Missouri, Arkansas, and Oklahoma and may start blooming as early as the first part of January. Its flowering season extends from then on until April. If brought into the Chicago region, it blooms in March and is often ahead of the skunk cabbage. Thus this shrub often has the honor of being the first harbinger of spring in the Chicago region, although not native here.

Some of the pussy willows open their buds and expose their silky white catkins very early. One of the pussy willows native to this area, *Salix discolor*, is found in swamps and wet ground but is perhaps not as well known as the other type of pussy willow, *Salix caprea*, a native of Europe commonly planted in parks and around homes and often referred to as "pussy willow." These willows may open their buds in March, but their flowers do not appear before those of the Ozark witch hazel.

Elsewhere, for instance in the West and Southeast, the seasons are quite different and other species indicate the arrival of spring. However, only northern (excluding Washington and Oregon) and central United States have severe winters during which plant growth is suspended and at the end of which harbingers of spring are more conspicuous than in other parts of the country.

JULIAN A. STEYERMARK
Associate Curator of the Herbarium

PLEASE NOTIFY MUSEUM IF YOU'RE MOVING

Members of the Museum who change residence are urged to notify the Museum so that the BULLETIN and other communications may reach them promptly.

Members going away during the summer may have Museum matter sent to their temporary addresses.

Visitors from Netherlands, Mexico, and India

A recent group of distinguished visitors to the Museum included Dr. P. S. Oud, Burgomaster of Rotterdam; Mr. Ch. G. Matser, Burgomaster of Arnhem; Dr. J. B. V. M. J. van de Mortel, Consul General of The Netherlands, and Mr. A. P. van der Burch, consul of The Netherlands in Chicago. Mr. John R. Millar, Deputy Director of the Museum, and Dr. Fritz Haas, Curator of Lower Invertebrates, conducted the guests on a tour of zoological and anthropological exhibits.

Mr. Miguel Covarrubias, famous artist and archaeologist from Mexico, and Mr. Daniel F. Rubin de la Borbolla, director of the National Museum of Mexico, were entertained at the Museum by Dr. Paul S. Martin, Chief Curator of Anthropology, and other members of the department staff. Another noted visitor to this department was Dr. Paul Wingert, anthropologist and expert on primitive art at Columbia University.

Dr. B. Sahni, professor of paleobotany at the University of Lucknow in India and director of the Institute of Paleobotany at Delhi, visited the Museum as the guest of Colonel Clifford C. Gregg, Director. He was conducted through the Departments of Botany and Geology by Dr. Theodor Just and Dr. Sharat K. Roy, Chief Curators respectively of these departments.

Mr. B. V. Gharpure, curator of the Lord Reay Maharashtra Industrial Museum at Poona, India, made a survey of museum methods under the guidance of Deputy Director Millar and the heads of several scientific departments.

LIFE OF THE COCHISE, EARLIEST INDIANS OF THE SOUTHWESTERN U. S. AREAS

By JOHN RINALDO
ASSISTANT IN ARCHAEOLOGY

An exhibit recently installed in the Museum's Hall of American Archaeology (Hall B) presents a visual story of one group of the very earliest inhabitants of southeastern Arizona and southwestern New Mexico. This new exhibit illustrates the way of life of a people known to archaeologists as the Cochise Indians.

The earliest evidences of these people are found in the banks of steep-sided gulleys and in the beaches of dried-up lake beds located in the basin and range area of the sites of these people. The charcoal from these hearths is particularly significant because that from the earliest levels is of cottonwood and hickory trees, which no longer grow in this area and which indicate a more wooded, more humid, and colder environment, quite different from that prevailing in the arid desert region this area has become today. Further evidence of this change in climate and environment is offered in the association in these same levels of the bones of extinct animals such as the mammoth, an extinct form of camel, the dire wolf, an early form of bison, and improvements can be noted, such as finer chipping in the latest periods wherein smaller chips were thrown off with a different technique (called pressure flaking) as distinguished from the large, crude, roughly flaked implements of the earlier periods.

In the same space we have shown a part of the cycle of climate and the progressive drying up of the area that took place. Because this is roughly correlated with the changes in culture, it brings up once more the unsolved problem of the relationship between culture and environment.

A third panel of the exhibit consists of

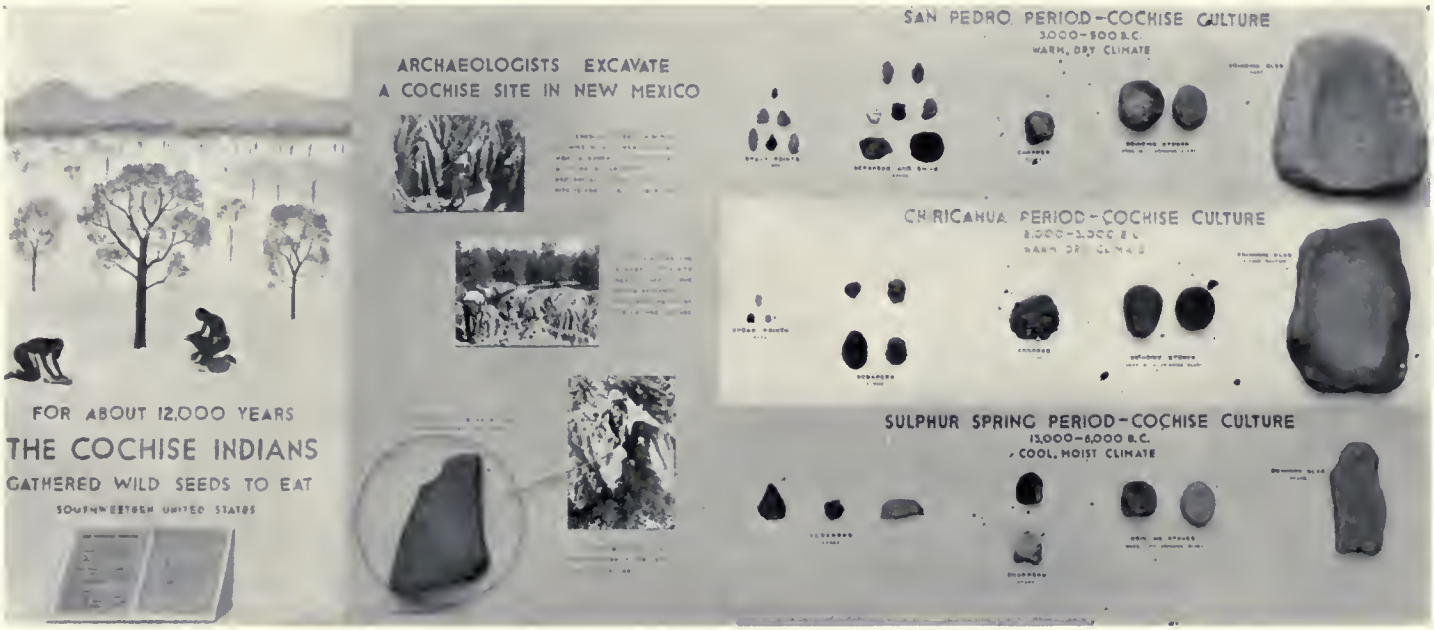

EXHIBIT ILLUSTRATING CULTURE OF ARIZONA AND NEW MEXICO INHABITANTS OF ABOUT 13,000 B.C.

southwestern United States. Dr. Ernst Antevs, Research Associate in Glacial Geology on the Museum staff, has studied the soil levels in which the Cochise implements are found and he estimates that the earliest levels of this culture date from 12,000 to 13,000 B.C. That is to say, the tools found in the earliest Cochise deposits are 14,000 or 15,000 years old.

The implements most frequently found in these deposits are milling stones or grinding stones. These are flat or concave stone slabs used as nether milling stones and smaller stones closer to hand-size that were held in the hand and rubbed over the seeds or nuts placed on the grinding slab. Other tools discovered are flaked implements (blades and cutting edges), scrapers, and hand axes. A few dart points have also been found, as well as some charred and split bone.

REVELATIONS IN CHARCOAL

The tools are sometimes uncovered near hearths of fire-cracked rocks and charcoal, which mark the locations of ancient camp other fossils which suggest that the lake beds date from the last pluvial (rainy) period—the correlative in that area of the latest ice age.

Thus we have depicted these people as living on the lightly forested shores of lakes and practicing a food-gathering economy—that is, gathering and grinding nuts, seeds, roots, and berries—rather than hunting, which they practiced to a lesser extent. This is clear from the small number of dart points and the small quantity of split bone found in contrast to the great number of milling stones and the variety of types.

In the other half of this exhibit we have illustrated the progressive development in the Cochise way of life as shown by changes in types and methods of manufacture of their stone tools. For example, changes in the size and shape of their milling stones are shown. Here an increase in size and a development from a small slightly concave slab to a large-basined implement with a specially prepared grinding surface can be noted. In the flaked implements, similar photographs and a specimen showing how the tools are found by the archaeologist. For example, a milling stone is shown in place in the banks of a gulley in one photograph and the actual specimen is shown on the screen close by.

The details set forth in this account are shown in the exhibit by means of a painting, photographs, stone tools, and two replicas of stone tools. The exhibit was designed by Mr. Gustaf Dalstrom, Artist in the Department of Anthropology, Mr. George I. Quimby, Curator of Exhibits, Anthropology, and the writer.

Harris Extension Display

A series of cases typical of the traveling exhibits circulated among the schools of Chicago by the N. W. Harris Public School Extension of the Museum has been placed on display in a ground-floor corridor in the north end of the building, east of the Children's Lunchroom and north of Hall J (Egyptian Archaeology).

COLLECTIONS FROM INDIA FOR GEOLOGY DEPT.

The Department of Geology has recently received from India a shipment, considerably delayed in transit, of about 4,000 invertebrate fossils and a series of ores and minerals relating to economic geology. The fossils were collected in the fall of 1945 by Dr. Sharat K. Roy, Chief Curator of Geology, from three localities in the Salt Range of the Punjab. The economic geology specimens were collected from various localities in eastern India. Dr. Roy was at that time on a month's leave from the United States Army Air Forces in the India-Burma theater.

The fossils just received are almost entirely productid brachiopods. Although much of our knowledge of the form and evolution of these brachiopods at the close of the Paleozoic comes from studies of Salt Range collections, relatively few fossils from this classic locality are to be found in American institutions. The specimens are in a fine state of preservation, representing about 50 species. They are in sufficient quantity to permit their study as "series," a technique usually applicable only to collections of modern forms and essential to an understanding of variability in any species.

With the accession of these fossils, the Museum gains an invaluable reference collection for the study of Permian brachiopods and of invertebrate evolution.

First Aid for Fathers and Mothers When Children Ask What or Why?

You know, of course, that a whale is not a fish. But if the children ask "Why?" or "How do you know?" would you be ready with a convincing answer, or would you find yourself floored? In case the data are not at the tip of your tongue, here is some ammunition to prove your point:

Fishes do not have hair, but whales do—inspection reveals a few bristles around the mouth. Fishes have scales; whales do not. Whales nurse their young with milk, but young fishes seek their own food from the beginning of their lives. Whales breathe by means of lungs, just as do other mammals; but fishes breathe with gills. The bones in a whale's flipper show it is really a five-fingered hand, related to the hand or forefoot in other mammals; fishes are not thus equipped. Two hind legs are visible on a whale's skeleton showing that its ancestors were once four-legged animals. And, if the children are sufficiently precocious to warrant getting slightly technical, you can finally point out that the "hammer-anvil-stirrup bones" found in the ear of man and all other mammals are present in whales, whereas in fishes these bones are represented by part of the lower jaw and gill apparatus. But maybe they'll *tell* you instead of asking!

Visiting Hours Change May 1

Beginning May 1, summer visiting hours, 9 a.m. to 6 p.m., will go into effect until September 6 (Labor Day).

Two Botany Mural Series, Ecologic and Economic

Series of large mural paintings decorate the walls of two halls in the Department of Botany. One series, in Martin A. and Carrie Ryerson Hall (Plant Life, Hall 29), shows in their native habitat some of the most important of the trees and plants illustrated in the exhibits. These paintings are by Staff Artist Arthur G. Rueckert and a former staff artist, the late Charles A. Corwin. In Hall 25 is a series of paintings by Julius Moessel representing scenes in many parts of the world pertaining to man's cultivation of vegetable foods and trade in them.

Museum Dimensions

Frequently asked question: What are the dimensions of the Museum building? Answer: It is 706 feet east and west, 438 feet north and south, and 104 feet high.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: W. A. R. Bruehl, Jr., Cincinnati—2 Eskimo baskets, Alaska.

Department of Botany:

From: Dr. James Plagge, Barrington, Ill.—70 herbarium specimens, Iowa; Mrs. Cora Steyermark, Barrington, Ill.—105 herbarium specimens, western United States; Dr. Maxwell S. Doty, Evanston, Ill.—66 specimens of mosses, Oregon and California; Sr. Ramón Gomez, Havana, Cuba—43 hand samples of woods, Cuba.

Department of Geology:

From: Dr. G. Winston Sinclair, London, Ont.—150 specimens of Chazyan Bryozoa, Canada; William J. Bingham, St. Paul—26 geological specimens, Minnesota; Captain Richard Grosvenor, Fort Clayton, Canal Zone—10 zeolite specimens, Canal Zone; John O. Griesbach, Chicago—a Foraminifera specimen, Nanumea Atoll, Gilbert and Ellice islands; Edwin Moe, Chicago—2 specimens of cretaceous ammonites, South Dakota; Anaconda Copper Mining Co., Butte, Mont.—7 mineral specimens, Montana; Reynolds Mining Corp., Alexander, Ark.—3 bauxite specimens, Arkansas; James M. Dupont, Chatham, N. J.—15 marine invertebrate specimens, New Jersey.

Department of Zoology:

From: Smithsonian Institution, Washington, D. C.—a fresh-water snail (paratype), Philippine Islands; Rupert L. Wenzel, Oak Park, Ill.—404 insects and allies, Tennessee and Georgia; Hugh B. Leech, San Francisco—2 beetles (*Lacornis pacificus*), one a paratype, British Columbia; Colonel Clifford C. Gregg, Valparaiso, Ind.—31 histerid beetles from termite and ant nests, mostly Brazil; J. E. Moore, Edmonton, Alberta—4 toads and 8 frogs, Canada; Dr. Carl J. Drake, Ames, Iowa—97 lacewing bugs and allies; Museum of Comparative Zoology, Cambridge, Mass.—69 fresh-water shells, South America; Josef N. Knull, Columbus, Ohio—21 buprestid beetles, United States; Dr. J. O. Nolasco, Calamianes, Culion Island, Philippines—29 parasites of a dugong, Philippine Islands; Raffles Museum, Singapore—155 bats, Malaysia; Chicago Zoological Society, Brookfield, Ill.—a mammal, Africa; Lincoln Park Zoo, Chicago—a mammal, Celebes; Henry van der Schalie, Ann Arbor, Mich.—567 land and fresh-water shells, Puerto Rico and Michigan.

Library:

From: Harold Palmer, Honolulu, Hawaii; Stuart H. Perry, Tucson, Ariz.; Viking Fund, New York; Laurence Wilson, Baguio, Philippine Islands; Henry W. Nichols and Miss Lillian A. Ross, both of Chicago.

LECTURE TOURS IN MAY, DAILY EXCEPT SUNDAYS

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays (the Friday tours open with an introductory lecture and slides or films in the Meeting Room on the second floor of the Museum); a schedule of these follows:

Wed., May 5—Big Game Animals (*Lorain Farmer*).

Fri., May 7—Family Customs (National Family Week). Illustrated introduction in Meeting Room (*June Buchwald*).

Wed., May 12—Tales of Tails—Animal Tails (*Jane Sharpe*).

Fri., May 14—Facts and Fallacies in Natural History. Illustrated introduction in Meeting Room (*Winona Cosner*).

Wed., May 19—Meet the Mammals (*Lorain Farmer*).

Fri., May 21—Where Did Your Gardens Start?—Some Common Fruits and Vegetables. Illustrated introduction in Meeting Room (*Marie Svoboda*).

Wed., May 26—Flowers as Symbols—Use of Flowers to Express Ideas (*Miriam Wood*).

Fri., May 28—Footwear Fashions—The "New Look" in Ancient Shoes (Foot Health Week). Illustrated introduction in Meeting Room (*Harriet Smith*).

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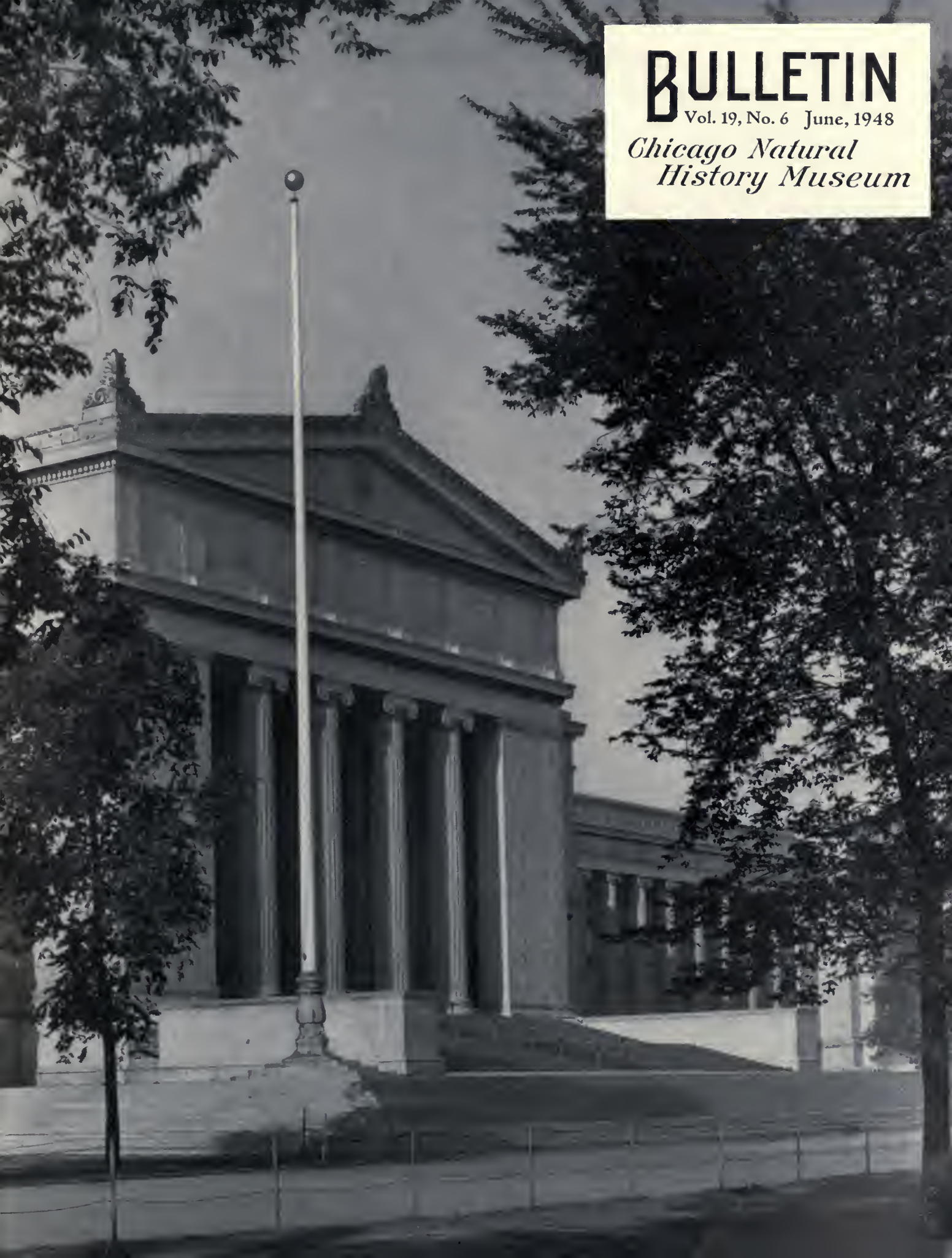


BULLETIN

Vol. 19, No. 6 June, 1948

Chicago Natural History Museum

SOUTHWEST ARCHAEOLOGY EXPEDITION RESUMES

By PAUL S. MARTIN
CHIEF CURATOR, DEPARTMENT OF ANTHROPOLOGY

In June, the Southwest Archaeological Expedition will again take to the field to continue the archaeological researches instituted by the Museum in 1939 in western New Mexico.

Field researches during the last four seasons have been concerned with the origin and development of a newly discovered culture called the Mogollon. For the purposes of this article, culture may be defined as the sum total of tools, pottery, houses—the material belongings of a particular people in a given area. When we speak of the "Mogollon Culture" we really mean the Mogollon tribe of people, just as we might refer to the Apache tribe.

PAUL S. MARTIN
Leader of Expedition

At the present time, three separate "cultures" are recognized in the Southwest: (1) the Anasazi, (2) the Hohokam, and (3) the Mogollon. A vast amount of information is available for the Anasazi culture, a lesser amount for the Hohokam, and still less for the Mogollon.

KEY TO MANY PROBLEMS

Since so little work has been done in this last-named culture and since the solution to other cultural and archaeological problems in the Southwest hinged on information derived from the Mogollon culture, we chose to investigate it as thoroughly as possible. The results of our previous field work have proved fruitful beyond our fondest hopes and have enabled us to set forth much new information and to correct some older guesses. One thing that our work has done is to help establish the fact that there *was* such a thing as a Mogollon culture!

Archaeological field work really means obtaining history by means of excavations. In western New Mexico in the Pine Lawn Valley we have the record of part of the Mogollon tribe. It takes special training, much patience, time, and expense to recover the history of the Mogollones and to piece it together bit by bit.

What have we been able to "read" concerning the Mogollon culture in the reddish, dry soil of western New Mexico?

SIXTY CENTURIES BACK

The answer to this question is best given by comparing the historical periods that we have reconstructed to an eight-story building. If this building represents the total history of the Mogollon Indians through time and each floor represents a period of time, then the history of the Mogollon culture thus far known is as follows:

Deep down, several hundred feet below the basement of our building, is the foundation of the Mogollon culture. We call it the Cochise level. The people of the Cochise period made *no* pottery, planted *no* corn, ate seeds, nuts, and meat, and made and used stone tools so crude that they superficially resemble river rocks or cobblestones. These people lived about 6,000 years ago.

The basement and first floor of our building represent the Pine Lawn Period (A.D. 300–500); the second to fifth stories, the Georgetown and San Francisco Periods (A.D. 500–900); the sixth story, the Three Circle Period (A.D. 900–1000); the seventh story, the Reserve Period (A.D. 1000–1100); and the eighth story, the Tularosa Period (A.D. 1100–1200).

That is the sequence of development of the Mogollon culture in western New Mexico as we have reconstructed it. Some of this history is based on our own digging, e.g., the Cochise, Pine Lawn, and Three Circle Periods. The remainder is conjectural and rests, not on our digging but rather on our archaeological survey—that is, a planned search for ancient habitations and villages.

THIS SEASON'S PROGRAM

This summer, we hope to be able to dig out (literally) information on the people who lived in the Georgetown, San Francisco, Reserve, and Tularosa Periods. This is a large order and calls for much intensive work. In other words, our "building" as of now is merely an open framework, and much finishing needs yet to be done.

One interesting phase of our problem is the interconnection between the Mogollon and the Anasazi or Pueblo tribes. We feel fairly certain that the Pine Lawn Valley was abandoned about A.D. 1200. Where then did the people move to? They did not evaporate. They must have gone somewhere, and there must have been some reason for leaving their homeland.

We have suspected for some time that there had been trade relationships between the Mogollon and Anasazi Indians. We also feel fairly certain that some cousins of the Mogollon Indians were independently working out a slightly different way of life in an area just north and west of us in Arizona. Answers to these problems may not be forthcoming this season, but we expect to trace the exodus of the Mogollon Indians and to determine what their fate was.

The expedition will remain in the field until about the middle of September. The personnel will include, besides the writer as leader, Dr. John B. Rinaldo, Assistant in Archaeology; Mr. Donald Collier, Curator of South American Ethnology and Archaeology; and Dr. Ernst Antevs, of Globe, Arizona, the Museum's Research Associate in Glacial Geology. In the field, the expedition will recruit a crew of about ten local laborers for assistance in excavations.

THIS MONTH'S COVER

The Museum in majestic solitude—early in the morning, before the throngs of summer-day visitors begin mounting the north steps. This striking picture was made by Mr. John Bayalis of the staff of the Museum's Division of Photography.

GEOLOGY EXPEDITION TO NEW MEXICO

Mr. Harry E. Changnon, Curator of Exhibits, Geology, and Mr. Robert Kriss Wyant, Curator of Economic Geology, will spend several weeks collecting geological specimens in the Black Range and adjacent areas in New Mexico this summer. The material collected will be added to the Geology Department's systematic study collection of physical geology and ores. Special effort will be made to obtain typical specimens for economic geology exhibits now being installed in Hall 36.

En route to the Southwest it is planned to collect a complete series of rocks and ores from Arkansas to show the origin of bauxite. Considerable time will be spent in the Black Range of New Mexico to obtain representative ores and physical geology specimens from various mining camps. On the return route, mining areas in Colorado and the Black Hills of South Dakota will be visited.

Wyoming Paleontological Expedition

A paleontological expedition to west-central Wyoming will leave on June 1. The objective is to investigate the middle-upper Triassic formations of that area and to undertake an excavation in the Alcova limestone formation if a suitable place can be located. The party will stay in the field for three months, and the participants are Dr. Rainer Zangerl, Curator of Fossil Reptiles, and Mr. William D. Turnbull, Preparator.

Scope of Geology Exhibits

The most important branches of geology, all of them illustrated in Museum exhibits, are: *mineralogy; petrology*—the origin and description of rocks; *economic geology; structural geology*—deformation of the earth's crust by folding and fracturing; *geomorphology*—the study of landforms carved by surface agencies; *stratigraphy*—the order and distribution of rock formation laid down by water and wind; and *paleontology*—fossil plants and animals entombed in rocks.

BERMUDA DEEP-SEA EXPEDITION TO BEGIN PROBING OCEAN FLOOR MYSTERIES

By KARL P. SCHMIDT
CHIEF CURATOR, DEPARTMENT OF ZOOLOGY

The lightless depths of the sea afford one of the last strongholds of the unknown for descriptive zoology. Remarkable and bizarre creatures had long been known from occasional corpses washed ashore in regions of upwelling currents and from the food of deep-diving whales, when the first systematic trawling at great depths in the last half of the 19th century brought to light a whole fauna of previously unknown creatures. Deep-sea dredging also disclosed the fact that the lightless zones of the sea are illuminated not only by pinpoints of light from the light organs of fishes and crustaceans and squids, but by whole masses of diffuse light from the bacterially lighted bodies of sea fans and types of animals with the plant-like habit of being fixed to the bottom.

The life of the deep sea is remarkable among the great faunas of the world for its state of unbalance. Since there is no plant life, other than bacteria, green plants being completely dependent upon sunlight, the animals of the lightless depths are dependent on the rain of falling bodies from the rich life of the lighted surface zone. Thus the deep-sea animals must be scavengers or must prey voraciously upon each other.

The remarkable discovery of male parasitism in the deep-sea angler fishes, in which a minute male becomes permanently attached at some point on the body of the female and is fed through her blood circulation, reflects the fact that a major problem for deep-sea creatures lies in the finding of each other by the opposite sexes. The development of light organs of the most diverse arrangement, each type characteristic of a species, reflects the same difficulty.

These represent some of the particular matters that are to be presented in the Museum's proposed exhibits of deep-sea animal life. In drawing up plans for such an exhibit, paintings made by Staff Taxidermist Leon L. Pray were found to be of such evident interest that they were placed on temporary exhibition in a case at the end of the Hall of Fishes (Hall O).

The extreme novelty in inland Chicago of the creatures of the deep sea to be searched for by the Museum's Bermuda Deep Sea Expedition of 1948, plus the inevitable aspect of the greatest game of chance in the world represented by hauling a trawl net at great depths in the open ocean or dredging on sea-bottom a mile beneath the surface, has lent an air of more than usual excitement and anticipation to the preparations for engaging in this activity.

Oceanographic research and collecting would ordinarily be beyond the scope of Chicago Natural History Museum. The offer of co-operative participation in a program of deep-sea collecting from Dr. Dugald E. S. Brown, Director of the Bermuda Biological Station for Research, at St. George's West, Bermuda, in which the Museum could sponsor a new oceanographic vessel, provided and equipped for deep-sea collecting by the Woods Hole Oceanographic Institution, affords a unique opportunity and this was cordially accepted by the authorities of the Museum. The vessel to be used is the *Caryn*, a 98-foot ketch-rigged yacht with auxiliary power.

The staff assembled under the leadership of Dr. Fritz Haas, Curator of Lower Invertebrates, will be based at the Bermuda laboratory. It will consist of Dr. Haas, Mrs. Marion Grey, Associate in the Division of Fishes, and Mr. Ronald J. Lambert, Assistant Taxidermist. Mr. Loren P. Woods, Curator of Fishes, at present "on loan" to the United States National Museum, will join the expedition for the first three weeks of its operations. Dr. Lyell J. Thomas, of the Department of Zoology of the University of Illinois, will be the guest of the Bermuda Station during the last six weeks of operation of the *Caryn* and, in co-operation with the Museum party, will engage in the examination of deep-sea fishes, crustaceans, and squids for their as yet largely unknown parasites.

Dr. Haas' life-long studies on mollusks and other invertebrates include examination of the coral-reef fauna of Bermuda in 1947, while studying at the Bermuda Station; Mrs. Grey is qualified especially for the work envisaged by ten years' study of the literature of deep-sea fishes; and Mr. Lambert has had broad experience in preparation of specimens of marine creatures both for study and exhibition, gained on the Leon Mandel Galapagos Expedition of 1941, in which Mr. Woods also participated. It may be pointed out that the operations of the *Caryn* and the studies of the party will be greatly facilitated by the opportunity of working from a shore base.

SOME OF THE DEEP-SEA FISHES TO BE SOUGHT BY THE BERMUDA EXPEDITION DEPARTING THIS MONTH

Represented now only by a temporary exhibit in the form of a painting by Staff Taxidermist Leon L. Pray, it is hoped that the Museum will acquire actual specimens of the above grotesque creatures and many others when this summer's work on the research ship Caryn is completed. At the lower left is the bizarre angler fish (Reganula gigantea), which carries its own fishing rod and bait to lure the smaller fishes that it consumes. The fishes shown are all conditioned by nature for life in the face of intense pressures, frigid water, and complete darkness in the sub-depths of the seas. New species await discovery.

'TERROR BIRD' OF ELEVEN MILLION YEARS AGO RESTORED

By ELLEN T. SMITH
ASSOCIATE, DIVISION OF BIRDS

ABOUT 1890 the scientific world was startled by the report from Argentina of the discovery of fossil remains of several enormous birds, entirely unlike anything previously known to man. Some were eight feet in height. They were obviously carnivorous and must have presented a terrifying appearance in life. The range of the period in which members of this group lived was estimated at between eight and thirty million years ago, varying with different species.

Although the largest of these enormous flesh eaters was the eight-foot *Brontornis*, the smaller *Mesembriornis* was perhaps even more formidable. It must have been a nightmarish terror to the animal life of its day, upon which it preyed, according to Mr. Emmet R. Blake, Associate Curator of Birds, and Mr. Bryan Patterson, Curator of Fossil Mammals.

Mesembriornis was only five feet high, but it was much better equipped as a bird of prey than the more cumbersome *Brontornis*. Built for speed, it must have been a phenomenally fast runner, probably using its proportionately small wings to help maintain its balance, for it was incapable of flight. Strong feet and big curved claws combined with its huge head and powerful hooked beak to make it probably the most dangerous bird ever to have existed. Thus equipped, it could easily tear apart, crush, and cut the bones of mammals, lizards, snakes, and other animals, which it devoured voraciously. It was restored recently at the Museum in all its frightful mien, and when pictures of it were released to the newspapers they at once labeled it in "headlinese" fashion with the name "Terror Bird."

There was a unique gap in the Tertiary fauna of South America, caused by its complete isolation at the beginning of, possibly even before, the Age of Mammals. No true carnivorous mammals developed on that continent, and the huge carnivorous birds filled this gap. Shortly after North and South America became joined, about four million years ago, true carnivorous mammals made their way all over the southern continent, and these birds became extinct.

The first restoration of *Mesembriornis* ever shown in any museum and displayed in Ernest R. Graham Hall—Hall 38 (see *Field Museum News*, March, 1941) has now been supplemented by the first life-like reproduction, on view in Hall 21. *Mesembriornis incertus* Rovereto was the species chosen to represent the genus. This masterpiece is the work of art of Mr. Leon L. Pray, staff taxidermist, who in almost 50 years' connection with the Museum has developed many new techniques.

After careful research, the first step in making the reproduction was the drafting of a miniature model. Next, life-sized skull and wing and leg bones were carved in wood and assembled on a pine body core, or center-board, cut from the outline of the skeleton, with heavy iron rods used for support. Wire netting was shaped around the wooden skeleton to approximate the fleshy anatomical conformation.

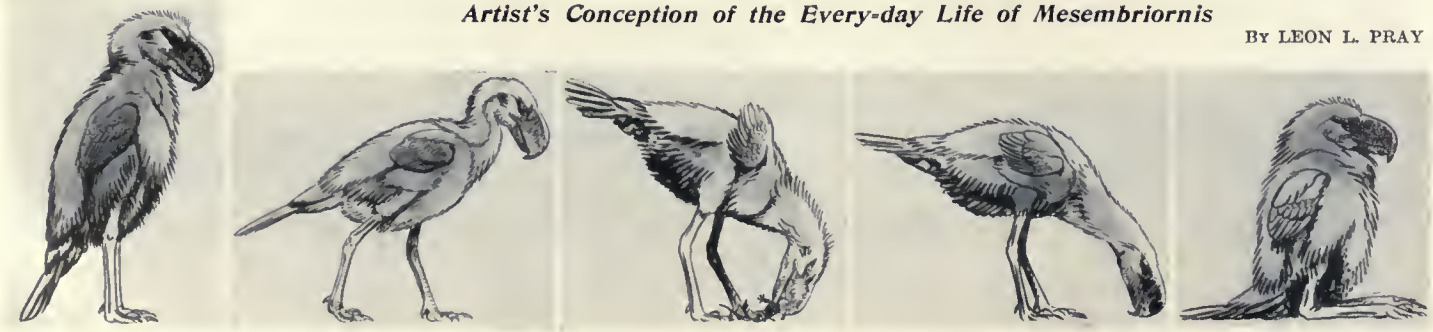
An amazing mixture that Mr. Pray modestly calls "casein paint composition" is concocted from casein paint, ground asbestos, chopped tow, and a large mass of pencil sharpener shavings. Mr. Pray found the pencil shavings, including the graphite, far superior to the shavings from masonite board. This was used to complete the

FINAL GROOMING OF MESEMBRIORNIS

Staff Taxidermist Leon L. Pray puts the finishing touches on life-size restoration of the "Terror Bird." The model is now on exhibition in Hall 21.

Artist's Conception of the Every-day Life of Mesembriornis

By LEON L. PRAY



Thinking about lunch | On the prowl | Shredding the victim | Good to the last morsel | Gorged

BASIS OF RESTORATION

Complementing Department of Zoology's new exhibit is this actual skeleton of Mesembriornis incertus in the Department of Geology's Ernest R. Graham Hall (Hall 38). The skeleton formed the factual and scientific basis for Mr. Pray's life-like reproduction. In making the restoration, Mr. Pray first synthesized a skeleton modeled after this as a framework. Shown here also is the skeleton of a golden eagle to provide a comparison in size with Mesembriornis.

bird's superficial anatomy. Then when this surface was dry, the plumage was modeled over it, partly just with the casein paint composition, partly with balsa-wood feathers imbedded into it. The balsa-wood feather forms were made by sawing the wood in curved planes on a band saw and then splitting and whittling them into individual shapes.

The feet and claws were carved from tulip-tree wood (commercially known as Carolina poplar) because it is strong and tough and does not split. Eyes always present a problem and are subject to never-ending experiment. Mr. Pray thinks that the eyes of this reconstruction are the best he has ever made. They were carved from thick plexiglas, sanded down smooth, and then glazed with clear liquid plexiglas. The iris was colored with tube oil colors mixed into fluid plexiglas.

The cariama of present-day Brazil and Argentina, with its marked tendency toward ground-dwelling habits, its insectivorous-carnivorous diet, and its weak powers of flight, is the closest living relative of *Mesembriornis*. It is from the cariama that the clues for coloration and feather formation in Mr. Pray's model are derived. The life-like result obtained makes one wonder whether to regret never having seen this wonderful bird in action ten to eleven million years ago or to be glad that there is no possibility of meeting it face to face.

Bird Collecting in Mexico

About July 1, Mr. Melvin Traylor, Jr., Associate, Division of Birds, will leave for a two-month collecting trip in southern Mexico. He expects to establish his headquarters near Cordoba, Vera Cruz, and to collect at various elevations on the eastern slope of Mt. Orizaba. This is probably the best known historical collecting site in Mexico, and fresh ornithological material from the region will be a welcome addition to the Museum's research collection. The collection will also afford an opportunity to study the vertical distribution of many species of birds that are known only from the general area, since in a distance of only thirty miles Mt. Orizaba rises from an elevation of less than 2,000 feet in the tropics to 18,000 feet and perpetual snow.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the past month:

Department of Anthropology:

From: Mrs. Alice H. Gregory, Chicago—four costumed dolls and groups of dolls, Guatemala.

Department of Botany:

From Prof. M. M. Lacás, Laredo, Texas—56 phanerogams and 38 cryptogams, Texas; Luis Augusto Grandvaux Barbosa, Lourenco Marques, Africa—28 herbarium specimens, Mozambique, Africa; Jens E. Nielsen, Chicago—31 diatoms; Dr. T. A. Stephenson, Aberystwyth, Wales—15 specimens of algae, Florida and California; Colin C. Sanborn, Chicago—20 cryptogams, Arkansas; Dr. Eula Whitehouse, Dallas, Texas—27 specimens of algae, Texas.

Department of Geology:

From: Eagle Picher Research Laboratory, Joplin, Mo.—8 by-products of lead and zinc, Missouri.

Department of Zoology:

Dr. Henry van der Schalie, Ann Arbor, Mich.—567 specimens of land and fresh-water shells, Puerto Rico and Michigan; Chicago Zoological Society, Brookfield, Ill.—a Philippine tarsier and a python; Mr. and Mrs. Frederick Greeley, Madison, Wis.—2 snakes and 2 land shells, Wisconsin and Point Pelee Island, Lake Erie; Major Howard T. Wright, U. S. Army—3 lots of isopods, 6 fresh-water crabs, and 262 lizards, salamanders, frogs, tadpoles, and a snake, Japan; Loren P. Woods, Washington, D. C.—9 frogs, Maryland; Lawrence Curtis, Dallas, Texas—7 copperheads, Texas; J. C. Dickinson, Jr., Gainesville, Fla.—a coral snake and 5 blind lizards, Florida; Paul Springer, La Grange, Ill.—3 salamanders and 2 frogs, Illinois; Prof. E. McCallan, St. Augustine, Trinidad, B. W. I.—4 lizards, Trinidad; Roger Conant, Philadelphia—9 frogs, Maryland and Delaware; Dr. D. S. Bullock, Angol, Chile—18 bats (*Myotis chiloensis*), Chile; Dr. Arthur D. Hasler, Madison, Wis.—11 fresh-water fishes, Wisconsin; Ross Tarrant, Wilmette, Ill.—7 fishes, Walker Key, B. W. I.; Dr. Henry Field, Washington, D. C.—100 fresh-water shells, Egypt; Mrs. Lucile B. Harris, St. Petersburg, Fla.—one amphisbaenid (lizard), Florida; Charles M. Miller, Los Angeles—3 limbless lizards (*Anniella*), California; Brother Niceforo Maria, Bogotá, Colombia—3 bats, Colombia.

Library:

From: Mafalda Brugger, Basel, Switzerland; Col. Clifford C. Gregg, Valparaiso, Ind.; and Miss Marie Wilson, Northwestern University, Evanston, Ill.

Division of Motion Pictures:

From: Mr. Rudyerd Boulton, Washington, D. C.—film taken on numerous expeditions to Panama and Africa: expedition activity, birds, mammals, insects, native industry, dances, and other scenes.

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SHARAT K. ROY.....*Chief Curator of Geology*
KARL P. SCHMIDT.....*Chief Curator of Zoology*

MANAGING EDITOR

H. B. HARTE.....*Public Relations Counsel*

Members are requested to inform the Museum promptly of changes of address.

MONTANA BABY-SITTERS EARN TRIP TO MUSEUM

An unusual group of visitors to the Museum recently was an organized unit of more than a hundred boys and girls of high-school age from Miles City, Montana. They paid their own way for a trip to Chicago to see this institution and other attractions of the city, from money saved out of their earnings in odd jobs of baby-sitting, lawn-mowing, helping householders with their spring cleaning, etc.

From Allegan County, Michigan, the county school system brought by special train a group of 1,200 rural school children for a visit to the Museum. These children represented 115 elementary schools and eight high schools within an area of 834 square miles.

COURSE IN NATURE STUDY FOR CAMP COUNSELORS

A one-day course in nature study for camp counselors will be given at the Museum by the staff of the James Nelson and Anna Louise Raymond Foundation on Saturday, June 12. The group will have an all-day session, beginning at 9:15 A.M. and ending at 4:30 P.M.

The theme of the session is: "The world out-of-doors forms a natural unit whose parts are interdependent." The course will aim to furnish an understanding and appreciation of this inter-relationship and balance that will help persons who are to supervise camp activities in acquainting their charges with the out-of-doors. One phase of the counselors' course will consist of information available in the Museum—how to find it and use it; suggested books, magazines, pamphlets, etc.; films, pictures, and other visual aids and their place in camp.

Brief information will be presented in the following categories: Plants, insects, snakes, mammals, birds and their calls, fossils, and earth stories. Outlines will be given for suggested activities and techniques in making nature collections, from insects to rocks, developing hobbies in nature, and organizing games for developing interests.

All recreational leaders are welcome to attend, and there is no admission fee. For further information call the Raymond Foundation at the Museum (WABash 9410). Application forms for the course are available by mail.

STAFF NOTES

Mr. Colin C. Sanborn, Curator of Mammals, will leave early in June for a second collecting trip in Arkansas, in continuation of a program of field study in that state. . . . **Mr. Karl P. Schmidt,** Chief Curator of Zoology, and **Mr. Robert F. Inger,** Assistant in the Division of Reptiles, have returned from a brief trip to Texas. They were more than usually successful in obtaining interesting specimens of frogs, salamanders, lizards, and snakes. . . . The Museum's Guatemala Expedition led by **Mr. Rupert L. Wenzel,** Assistant Curator of Insects, reports a most cordial reception from entomological colleagues in Guatemala and initial success in collecting on the slopes of the Volcan Fuego. . . . **Dr. R. M. Strong,** Research Associate in Anatomy, Mr. Sanborn, and Mr. Schmidt, attended a hearing before the Cook County Board of Commissioners relative to a program of fox hunting by sportsmen in the Cook County Forest Preserves, *to testify in behalf of the foxes.* . . . **Mr. Donald Collier,** Curator of South American Ethnology and Archaeology, has been appointed representative of the American Anthropological Association on the National Research Council, for a three-year period. . . . Mr. Collier, **Mr. George I. Quimby,** Curator of Exhibits, **Dr. Alexander Spoehr,** Curator of Oceanic Ethnology, and **Dr. John B. Rinaldo,** Assistant in Archaeology, all attended the joint meetings in Milwaukee last month of the Central States Branch of the American Anthropological Association and the Society for American Archaeology. Mr. Quimby was elected secretary of the latter society. . . . **Mr. Eugene S. Richardson, Jr.,** Curator of Fossil Invertebrates, gave an address before the Illinois Junior Academy of Science, meeting at Benton, Illinois, on the subject of "Some Major Features of the Earth's Crust." Following the meeting he and Mr. Alan Jager, Antioch student, working in the Department of Geology, spent three days collecting fossils in southern Illinois.

DESLOGE EXPEDITION BACK FROM PERU

The Desloge Peruvian Botanical Expedition, 1948, has returned after studying cultivated plants in the highlands and valleys of Peru. The three members of the expedition, Dr. Hugh C. Cutler, Curator of Economic Botany at the Museum, and Mr. Joseph Desloge and Mr. Arthur Hoskins of the St. Louis Academy of Science, investigated the plants grown by the Indians of the highlands and those plants of the lower altitudes that were brought to the market places for sale and exchange.

One of the interesting plants studied yields the cocaine used in medicine (and as a narcotic by some drug addicts). The cocaine plant, or *coca* as it is called in Peru and Bolivia, is grown in terraced valleys about 5,000 feet above sea level. The leaves are picked by hand, dried, and pressed into bales for shipment.

The Indians of the central Andes are rarely ever without a quid of coca leaves in their cheek. The custom of chewing coca leaves is so common that most large haciendas pay part of their wages in leaves. An alkali, usually ashes or lime mixed with clay, is added to the quid, for without it there is little effect. This practice is strikingly similar to the use of ashes or lime with betel nut in the western Pacific Islands.

The most valuable collection of material made in Peru is a series of unusual ears of corn to be used in an exhibit of this purely American plant.

NEW MEMBERS

The following persons became Museum Members between April 16 and May 15:

Associate Members

Jared Gage Danley

Sustaining Members

Chester G. Moore, Lyman M. Simpson

Annual Members

Hugo A. Anderson, Lyman Barr, George Berner, James H. Clark, Leslie H. Cook, Dr. William J. Dvonch, George H. Glade, Jr., John L. Graham, C. I. Gustafson, L. S. Haynes, Carl Hilker, Raymond J. Hurley, Julius Jesmer, James H. Kennedy, Hugh D. Kenney, Dr. William Kirby, Hugo C. Lange, Dr. William H. Lange, Reuben J. Liffshin, Mrs. Clarence J. Loftus, Herbert J. Lorber, H. G. Mesirow, Norman M. Mesirow, C. R. Miller, Wendell O'Neal, Owen N. Price, L. F. B. Reed, Mrs. William M. Scudder, Kenneth S. Templeton, George C. Thiele, Richard F. Uhlmann.

FOUR-LEAF CLOVERS

By EMIL SELLA
CURATOR OF EXHIBITS, BOTANY

Most of us have heard time and again on the radio and elsewhere the current song hit "I'm Looking Over A Four-Leaf Clover That I Overlooked Before," recently resurrected after a prolonged period of dormancy. Not many listeners, however, may have had the good fortune of finding four-leaf clovers. But June is here, and four-leaf clovers, without music, should soon appear.

Have you ever taken the time to look for and find a four-leaf clover? If so, you will agree it is not a very profitable occupation. Nevertheless, for a number of years I have been in the habit of looking into an

'GOOD LUCK' IN ABUNDANCE

A clover plant, pressed for use as a herbarium specimen, reveals an unusual number of abnormal leaves —many four-leaf and even some five-leaf clovers.

occasional patch of clover with the intention of spotting this often elusive variation of the common three-leaf (*Trifolium* spp.).

Originally prompted by curiosity, this acquired practice can easily be recommended for certain occasions such as hot afternoons similar to some we had to endure last summer. All that is needed is a comfortable spot on a shaded lawn or meadow. While one is busy looking for four-leaf clovers, the heat is momentarily forgotten and one's power of observation is not suffering from inactivity.

FIVE LEAVES, TOO!

It was exactly in such a setting that I happened to find a whole plant of clover with at least three-fourths of its leaves other than the customary three-leaf. In fact many of them were *five*-leaved.

My curiosity being quickly aroused, I immediately decided to look carefully for possible similar plants. To our surprise, my companion and I soon found two more with the same abnormal variations.

Although it is quite possible that such plants have been observed by others, it was the first time I had ever seen anything like them. Believing they were rare enough, two of these plants were pressed for herbarium specimens and later photographed.

For the purpose of further observation, part of one of these plants was potted and kept most of the time in the shade of a garden shrub. The third plant was left growing in its natural environment and later re-examined. Within a few weeks of cool fall weather, both plants began to unfold new leaves of normal form and continued to do so until frost came to arrest further growth. The potted plant, kept indoors for the time being, is still producing the regular three leaves.

Repeated earlier instances convinced me some time ago that it was more difficult to find four-leaf clovers in the early summer than in August and September or after an extended heat wave.

SIDEWALK INCUBATOR

In addition, I recall distinctly that for several years, while tending our lawn, I could occasionally pick a four-leaf at the edge of a patch adjacent to the cement walk, the heat of which was reflected onto the nearby plants.

On the strength of the findings of last summer, I am more than ever inclined to believe that excessive heat is an important factor in developing abnormal variations, especially since these plants produced the regular three leaves with the return of normal seasonable weather.

These observations agree with the accepted knowledge of many abnormalities, the factors for which may be present in a plant but remain dormant until the plant is exposed to circumstances or environments that allow these same factors to develop.

Palau Expedition Returns

Mr. Henry S. Dybas, Assistant Curator of Insects, has returned from a six-month expedition to islands in the Pacific, sponsored by the Pacific Science Board of the National Research Council, in which Chicago Natural History Museum co-operated. Mr. Dybas' efforts were concentrated in the Palau group and in the Caroline Islands, particularly the Isle of Ponape. While the larger part of the collections will go to the United States National Museum in Washington, the Chicago museum will share in the material.

Pennsylvania Fossil Expedition

Mr. Eugene S. Richardson, Jr., Curator of Fossil Invertebrates, will be in the field from about the middle of June until the end of July. He will collect primarily fossils from several localities in Pennsylvania. If time permits he will visit several eastern museums to examine invertebrate exhibits with reference to the reinstallation of Frederick J. V. Skiff Hall (Hall 37).

Technical Publications Issued

Fieldiana: Geology Memoirs, Vol. 3, Nos. 1 and 2. *The Vertebrate Fauna of the Selma Formation of Alabama.* Part I. *Introduction.* Part II. *The Pleurodiran Turtles.* By Rainer Zangerl. April 30, 1948.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

THE GREEN WORLD OF THE NATURALISTS. By Victor Wolfgang von Hagen (Editor). Greenberg, New York, 1948. 392 pages. Price $5.

The "green world of the naturalists" is South America. Mr. von Hagen has made an interesting anthology of selections from the travelers who have contributed to the growth of knowledge about South America from the time of the discovery of the continent by Europeans to the present decade. His introduction makes the clever point that South America was kept hidden behind a "green curtain" by the Spanish and Portuguese for a century after the discovery, and that the final drawing aside of the curtain took place so lately as the nineteenth century. The sketches of the twenty-five authors represented are held to a proper brevity, after which they are allowed to speak for themselves.

The merit of an anthology lies in the bringing to renewed attention and availability something of the half-forgotten, long out-of-print, or rare, and Mr. von Hagen in this anthology (essentially his second for South America) presents some naturalists of great merit, like Felix de Azara and Alcide d'Orbigny, who are quite forgotten to the general public though well-remembered by that esoteric group of zoologists (now mainly confined to museums) who know animals by their Latin names. Azara and d'Orbigny both named animals and had animals named for them. The strictly scientific naturalists are preceded by the early travelers, like Amerigo Vespucci, Oviedo, and Carvajal, and by Lionel Wafer and William Dampier, of the buccaneer century. The era of scientific exploration begins properly with Condamine and Humboldt and continues with the great names of Darwin, Wallace, Bates, and Spruce to their successors of the twentieth century. The literary men whose writings exhibit the background of sea and forest and plains and desert are represented by Melville and Hudson and Tomlinson.

Altogether this is an excellent book to provide the casually interested reader with a comprehensive introduction to its subject. The serious reader will find some guidance to and background for the further exploration of those classics of natural history travels that should be on the shelves of every naturalist and likewise of every would-be naturalist.

KARL P. SCHMIDT
Chief Curator of Zoology

THE COBRA PLANT, WHAT IS IT?

By JULIAN A. STEYERMARK
ASSOCIATE CURATOR OF THE HERBARIUM

During the Chicago National Flower Show held at the Coliseum recently, the supposedly South American "cobra plant," also known as "cannibal plant," received considerable attention and publicity. Investigation by the writer proved that this was none other than the California pitcher

CALIFORNIA PITCHER PLANT
A drawing of the leaves and flowers. One-fourth natural size.

plant (*Darlingtonia californica*), native in California and Oregon and a well-known plant since its discovery in 1841 by Mr. J. D. Brackenridge.

Although in the West it may locally be called "cobra plant," most people know it either as California pitcher plant or Darlingtonia. The latter commemorates the surname of an early Pennsylvania botanist, Darlington, for whom it was named. *Standardized Plant Names*, a compendium intended to standardize common and scientific names of plants, gives "California pitcher plant" as the proper name.

NEW WORLD PITCHER PLANTS

The name "pitcher plant" refers to the pitcher-like structure of the leaves. In the Western Hemisphere three types are found: (1) *Darlingtonia californica*, or California pitcher plant, discussed above, a native of California and Oregon, (2) *Heliamphora*, a group of rare pitcher plants from isolated table mountains of Venezuela, and (3) *Sarracenia*, the well-known pitcher plants of the eastern half of the United States and Canada, represented by nine distinct species and two varieties. One of the species, *Sarracenia purpurea*, growing in sphagnum bogs in the Chicago region, ranges northward to Labrador and the Hudson Bay country and south to Florida and Louisiana.

The pitchers of *Darlingtonia* are provided with fishtail-like structures pointing downward from the inner sides of the hood-like tops. These structures faintly resemble hooded snakes about ready to strike. Part of the inner surface of the pitchers of *Sarracenia* is lined with glandular cells capable of absorbing animal proteins directly from the fluid contained in the lower part of the pitcher. In *Darlingtonia* and *Heliamphora*, on the other hand, the proteins of insect and other invertebrate bodies in the pitcher liquid are not absorbed directly by digestive cells but are first acted upon by bacteria. The latter apparently provide the proteins and other nutrients passing through the pitcher walls. No evidence is available indicating that the flowers can "eat the insects," for absorption of animal remains is limited to the lower part of the pitcher.

EXOTIC PITCHER PLANTS

Other "pitcher plants" have different modifications of leaves. Of these, the best known is the genus *Nepenthes*. In this type the leaf has a slender attachment that ends in an erect pitcher covered by a lid. Special glands in the pitchers digest animal bodies. Species belonging to this group occur wild from Australia and New Guinea west to Ceylon and Madagascar. Borneo appears to be the center of distribution of the genus, as more occur there than elsewhere.

The West Australian pitcher plant (*Cephalotus follicularis*), although belonging to another family, may also be mentioned here. This plant from southwest Australia has pitchers in the form of lids protruding above cup-like structures. These are arranged in a rosette at the base of the plant, below a cluster of ordinary leaves without pitchers.

AMERICAN PITCHER PLANT
The leaves in this species (Sarracenia purpurea) are modified into pitchers.

The public can be interested in unusual plants without recourse to new or fanciful names, or misinformation, as the facts concerning them are exciting enough. Actually,

OLD WORLD PITCHER PLANT
The pitchers in this species (Nepenthes) hang down from the tips of the leaves.

the "cobra plant" is "nothing new under the sun" but is well known.

Two of the illustrations on this page—those of the American and the Old World pitcher plants—show reproductions on exhibition in Martin A. and Carrie Ryerson Hall (Plant Life, Hall 29), where they may be seen in their natural colors.

LECTURE TOURS IN JUNE, DAILY EXCEPT SUNDAYS

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays (the Friday tours open with an introductory lecture and slides or films in the Meeting Room on the second floor of the Museum); a schedule of these follows:

Wed., June 2—Games of Chance (*June Buchwald*).

Fri., June 4—Color in Nature. Illustrated introduction in Meeting Room (*Jane Sharpe*).

Wed., June 9—What to Wear—Unusual Materials Used in Clothing (*Marie Svoboda*).

Fri., June 11—Toys—From Aleut to Zuni. Illustrated introduction in Meeting Room (*Harriet Smith*).

Wed., June 16—Summer Hobbies—Exploring the Out-of-Doors (*Miriam Wood*).

Fri., June 18—Baby Animals. Illustrated introduction in Meeting Room (*Lorain Farmer*).

Wed., June 23—Adventures of A Fossil Hunter (*Lorain Farmer*).

Fri., June 25—Your Vacation in the Rockies—The Story of the Mountains. Illustrated introduction in Meeting Room (*Winona Cosner*).

Wed., June 30—Your North Woods Vacation (*June Buchwald*).

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BULLETIN

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Chicago Natural History Museum

STUDIES OF THE VARIED PALMS IN CUBA

By B. E. DAHLGREN
CURATOR EMERITUS, DEPARTMENT OF BOTANY

In the days of West Indian travel by amphibian planes, I had had glimpses of Cuban palms strikingly suggestive of certain South American ones with which I was familiar, from the air as well as from the ground. In efforts somewhat later to reach the spots I had noted and then tried to log with reference to small harbors on the north coast of the island, I had made two plane trips to Cuba.

Those trips were, of necessity, brief and insufficient for satisfactory observations, but were rewarded by some results in the form of photographs and highly desirable collections, new, at least to me and to the Museum. I determined to return, if possible, for more extensive observations. Perhaps the most important result of those early trips was that they led to the acquaintance of the well-known Cuban botanist, Brother León, who during a lifetime of study of the plants of the island had given special attention to its palms. In the first volume of his *Flora of Cuba*, about 80 species and 16 varieties of these are listed, a considerable number for an island no larger than the state of Illinois and situated barely within the tropics.

RELATED SPECIES

Many of these palms are strictly Cuban and are found nowhere else. Some have their nearest relatives only in other West Indian islands. One was formerly included in a Pacific genus, with its nearest allies. A very few extend northward to form a part of the West Indian element of the vegetation of southern Florida, the Keys, and Everglade hammocks. A few connect, by way of the western end of the island and the Isle of Pines, with near-by Yucatan and Central America, where they are represented by closely related species. One predominantly South American genus has a single species in the mountains of eastern Cuba, while the largest genus of Cuban palms, with about thirty species, has some twenty-five of these in Cuba, with one in near-by Haiti and the remaining four in South America, one in Paraguay, one in northeastern Brazil, and two in Venezuela.

It was palms of this kind that have constituted my particular objective in Cuba—also, more recently, that of Dr. Hugh C. Cutler, Curator of Economic Botany, whose interest has been enlisted in a cytological study of the group. The unusual distribution of the genus, the relative uniformity of the few species over large areas in South America, contrasted with the great concentration and variety exhibited within the limited space of Cuba, raises many questions of why and how.

By courtesy of the Atkins Institution and Harvard University, some experimental plots have been started at its garden at Soledad, near Cienfuegos, and arrangements made for their care in intervals of our attention.

OBSTACLES TO COLLECTING

Thanks to the advice and company in many places of Brother León, it has been possible to visit, with a minimum of effort, many type localities that otherwise would have been difficult to find or to reach. Even with his aid, all attempts have not always been successful. Water, mud, and impassable roads were real obstacles. Also, flowering and fruiting times vary so much from one species to another that even with the utmost in mobility a full year's work would not suffice to gather a full representation of the palms of Cuba, scattered as they are over the 700 miles of length of the island, many in out-of-the-way places on one coast or the other.

COPERNICIA PALM

Brother León, who aided Dr. Dahlgren, is seen inspecting tree of a species discovered and described by him, and peculiar to the locality. Scene is on a large ranch, Sabanalamar near Sabalo.

Besides, what usually confronts a collector, especially of cytological material, at any one time or place is as likely as not to be material too far advanced, meaning postponement until next year, or not far enough advanced—calling for one or more repetitions of the visit within a few weeks or months. But for reasons of economy of time and money, one cannot always proceed so systematically, and instead takes what can be had, if at all acceptable, trusting to next time or another trip to supply what is lacking; that is, unless indeed the plant desired happens to be entirely sterile, as is often the case, when a photograph or a leaf may be all that can be obtained until it becomes possible to make another visit at the proper season.

(Editor's Note: Late in June Dr. Dahlgren left for Cuba to "make another visit at the proper season.")

THIS MONTH'S COVER

Did you know, or guess, what it is?

The cover on this BULLETIN is from a photograph obtained by using the central part of a fan-shaped Isle-of-Pines Copernicia palm leaf as background for the curving tip and branches of an immature flower-stem of the same palm. Photographs of such leaves, which cannot be preserved in their entirety, and of flower clusters, are necessitles for the research collections of the Department of Botany. Occasionally, as in this case, the two objects can be combined on one film. The specimen is one of many brought back by Dr. B. E. Dahlgren, Curator Emeritus of Botany, in the collections he made on his recent expedition to Cuba (see accompanying article on this page).

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Botany:

From: Prof. J. Soukup, Lima, Peru—117 herbarium specimens, Peru.

Department of Geology:

From: Eagle Picher Research Laboratory, Joplin, Mo.—8 by-products of lead and zinc, Missouri; A. A. Bakewell, Solon Springs, Wis.—47 specimens of fossil shells, Caloosahatchie Canal, Florida.

Department of Zoology:

From: Arthur H. Moeck, Milwaukee—2 butterflies (paratypes), New Mexico; C. H. Seig, U. S. Navy—25 frogs, Palau Islands; Roger Conant, Philadelphia—10 snakes, Maryland; Major H. T. Wright, Nagasaki, Japan—14 fresh-water fishes, 87 salamanders, 5 lizards, 8 crabs, and a shell, Japan; Dr. Rainer Zangerl, Harvey, Ill.—936 specimens of shells, Switzerland and France; Chicago Zoological Society, Brookfield, Ill.—a tree shrew, a black bear cub, a mole snake, a hinge-backed turtle, and 21 birds; Lincoln Park Zoo, Chicago—a Chinese turtle and a mammal.

Library:

From: Colorado Scientific Society, Denver; Dr. Henry Field, Washington, D.C.; Col. Clifford C. Gregg, Valparaiso, Ind.; Miss Thora Riley, Washington, D.C.; Karl P. Schmidt, Homewood, Ill.; and Spanish Embassy, Washington, D.C.

The anatomical characteristics of birds are graphically illustrated in an exhibit entitled "What is a Bird?" in Hall 21.

'BIRDS AS SOLAR MACHINES'—THE SUN'S PLACE IN BIOLOGY

By AUSTIN L. RAND
CURATOR OF BIRDS

The energy with which birds hop and fly, sing, and build their nests, comes from the sun. The materials that compose the bird's body, the materials of which each new coat of feathers is composed, and the substance that goes into the eggs, all come from the earth ("Dust thou art and unto dust shalt thou return").

But not directly. Plants are the only living things that can use directly the sun's energy and combine it with raw materials from the earth. Through the green stuff, chlorophyll, in their leaves, plants use the sun's energy to photosynthesize carbon dioxide and water into carbohydrates, and these may then be combined with mineral matter into other compounds, the compounds that form roots, stems, leaves, flowers, and fruit.

We would have no birds at all if it were not for the mantle of green vegetation that covers the earth. The dependence of birds on plants is more than a habitat preference and more than a need for shelter or nesting sites. Plants are the necessary converters that make energy and material available in a form birds can use. Without plants, all birds, with all animal life, would starve.

Birds eating these plant substances (fruit, seeds, leaves) are one stage removed from the source of raw materials. A great many birds live largely on other animals; the diet may vary from plant lice to dead mammals. But if you follow the chain back, sooner or later it will come to a plant eater. A vulture may feed on a cat that ate a shrike that ate a grasshopper mouse that ate grasshoppers that ate plants. The dependence on plants is inescapable. Though the plants are a necessary link in the chain, the final dependence on the sun for energy is also inescapable.

The use of the term "solar machines" in reference to birds is based on this dependence on the sun for energy as well as on the earth for material, and the bird as an organism takes in the material, its food or fuel. This is changed in the bird so that energy stored in the plant material is released and used in activity and heat production, and the material is changed into bird tissue or waste.

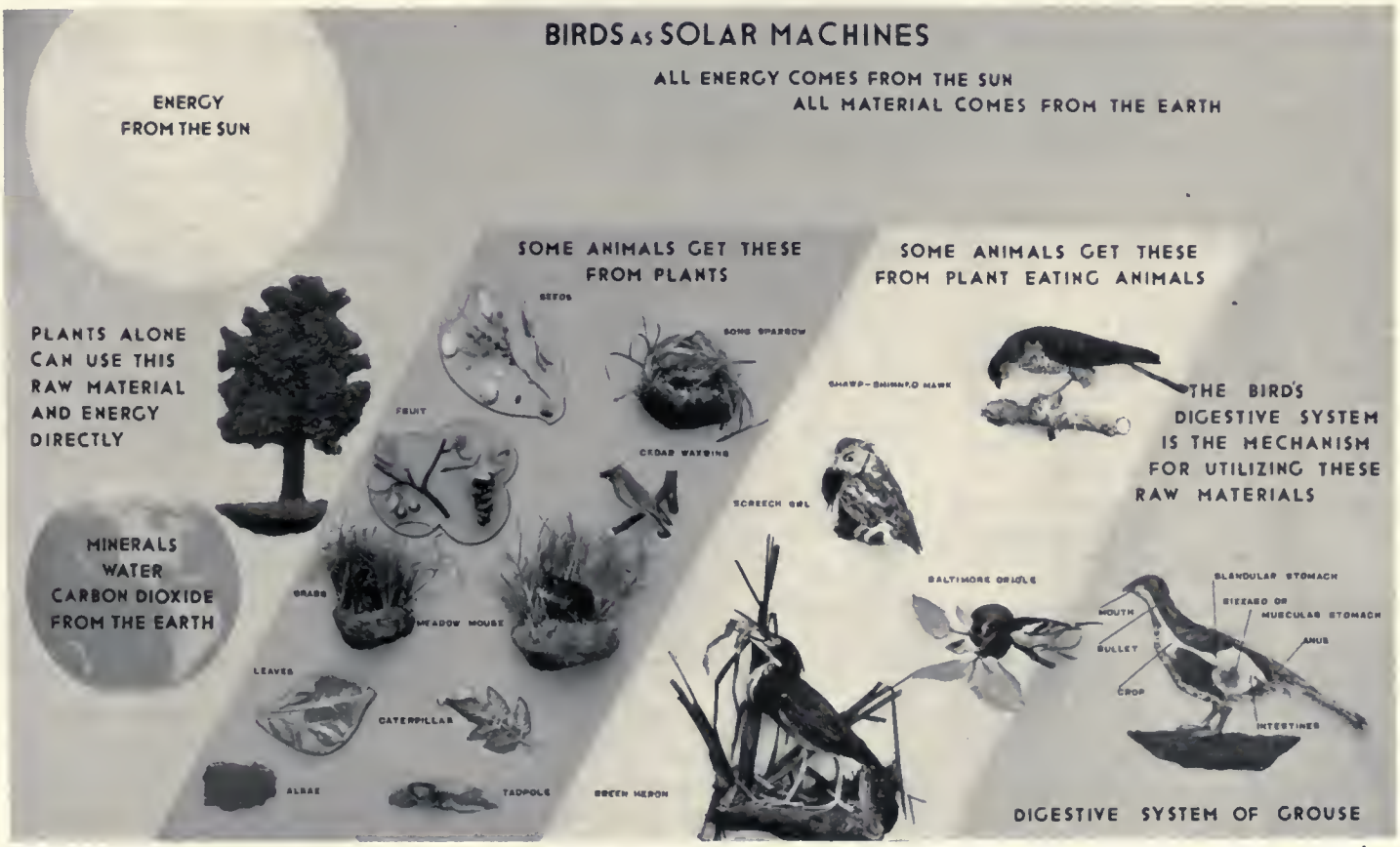
This simple but basic principle, true for most other animals as well as birds, is set forth in a new exhibit in Hall 21, devoted to the systematic exhibits of birds. The sun appears at the upper left, yellow in color, with the words "Energy from the Sun" across it. The earth at the lower left, in blue and green, is labeled "Minerals, Water, Carbon Dioxide from the Earth." Between them stands a tree symbolizing vegetation, which alone can utilize the two directly.

In the first column are some plant products utilized by animals: seeds, fruit, grass, leaves, and algae. Opposite each is one kind of animal that eats them—the sparrow eating seeds, the cedar waxwing eating fruit, the mouse eating grass, the caterpillar eating leaves, and the tadpole eating algae. These depend on plants and are one stage away from the raw material.

In the next column are birds two or more stages removed from the raw material, birds that feed on plant-eating animals—the hawk eating a sparrow, the owl a mouse, the oriole a caterpillar, and the heron a frog (frogs in adult life eat insects, but when young, as tadpoles, eat such plants as algae).

At the extreme right is the digestive system of a grouse, part of the bird's apparatus for using the bird's food (or fuel). The bill is used in seizing the food, as birds have no hands. The food goes down the gullet into the crop, where it can be stored until needed. Then it goes into the glandular stomach where gastric juices are secreted. In birds that eat grain or other hard food, the stomach may have thick muscular walls and be a gizzard, whose muscular activity helps to break down the food by mechanical

(*Continued on page 6, column 3*)



THE SUNLIGHT-EARTH-FOOD STORY OF BIRDS APPLIES EQUALLY TO ALL OTHER FORMS OF LIFE

The chain could be similarly charted for insects, reptiles, fishes, mammals, and other members of the Animal Kingdom—including, of course, Man.

TRAIL OF THE TEXAS BARKING FROG

By ROBERT F. INGER
ASSISTANT, DIVISION OF REPTILES

FOR a number of years Mr. Karl P. Schmidt, Chief Curator of Zoology, has been spending several weeks each spring in Texas. This spring I was privileged to make the trip with him. In planning our destination, we decided it would be a good idea to get specimens from the southwestern escarpment of the Edwards Plateau, a limestone formation that occupies west-central Texas. The collections of the Division of Reptiles contain specimens from only the northern parts of the escarpment, particularly from the region around Waco, where Mr. J. E. Johnson, Jr., a frequent contributor of specimens, has been an active collector for a number of years. The selection of the southern part of the Edwards Plateau, a part of Texas not previously explored herpetologically by Mr. Schmidt, fitted in with his study of the fauna of the state.

That region is also the home of the "barking frog," *Eleutherodactylus latrans*. This frog has a remarkable call that somewhat resembles the barking of a dog. This frog is interesting for a number of reasons. First of all, it represents the northernmost member of a tropical American genus. As far as is known, species of this genus, *Eleutherodactylus*, have breeding habits that are quite different from those of the familiar frogs. Instead of the usual frog pattern of laying large numbers of small eggs in water, of passing through an active tadpole stage, and then transforming into the adult land form, the species of this genus lay a small number of large eggs on land, do not have a tadpole stage at all, but develop directly into a land form within the egg. We hoped to get information on the breeding habits of the barking frog, which are still largely unknown. Of additional interest is the habitat of the barking frog. The home of this frog is in horizontal rock crevices and under large flat blocks of limestone. Apparently each individual has its own crevice into which it retreats at the slightest disturbance.

COLLECT HIGHWAY VICTIMS

Mr. Schmidt, his son John, and I made up the field party. We traveled in the Zoology Department's new carryall and slept along the road each night. We tried to take the least-traveled highways and, wherever we thought it advisable, we even drove over gravel and dirt roads, because one of the interesting and profitable observations to be made on such a trip is the frequency with which different species of reptiles and amphibians are seen on the road. This type of observation has been developed into a highly accurate and useful study by Dr. Lawrence M. Klauber, of San Diego, California. Dr. Klauber has kept detailed notes on hundreds of auto trips that he has made in southern California in the course of the last twenty years, recording each specimen seen along the road. Using such data, he has been able to make valuable estimates of the reptile and amphibian populations of southern California and draw exact maps of their distributions. Usually such specimens are found dead on the road, and it is now customary to refer to such specimens as "dead on road." Final contraction of this term has led to the use of DOR. By traveling on the least-frequented roads our opportunities for spotting DORs were increased and we found the scenery, minus billboards, much more beautiful.

Our route carried us along the north bank of the Illinois River, through the Ozarks region of Missouri and Arkansas, through

BARKING FROG
His call sounds like a dog's bark

the Ouachita Mountains of Oklahoma, and into Texas. We stopped in Waco to say "Hello" to Mr. Ed Johnson, who is comptroller of that city as well as a reptile collector. Our seeing him resulted in more than just a "hello." When he saw our vehicle and us in our collecting clothes, the temptation was more than he could withstand, and he decided to take the day off from work if we could be persuaded to collect with him around Waco. The opportunity to collect with the veteran Ed Johnson was far too interesting to miss.

Ed has developed the collecting of snakes to a high point of technical skill. His equipment, though simple, is unique. It consists of two crowbars and an old leather glove. The crowbars need further comment. Around Waco, which is on the edge of the Edwards Plateau, there are many large slabs of limestone under which snakes are fond of retiring. Turning over some of these rocks would be an impossible task without the aid of a good lever. Drive shafts from old Fords, beveled at the ends, serve this purpose. Of course, when one spends the entire day collecting, these crowbars are apt to become pretty heavy. Ed insists that one of the crowbars is lighter than the other and that he always gives the lighter one to the visitor. However, it seemed to the one of us who carried the bar that the one we had must be the heavier. We tried swapping crowbars with Ed from time to time but that didn't seem to make much difference.

'BIGGEST ONES GET AWAY'

The day's collecting was not profitable so far as the number of specimens collected was concerned; however, a day in the field with Ed Johnson is not without its rewards. Some of the stories of his own experiences with which he regaled us are worthy of note. As I said before, Ed has been collecting around Waco for many years. In Texas the western diamondback rattler is a much discussed and prominent feature of the fauna. Ed has collected his share of this snake. As is usual with most human beings where snakes are concerned, Texans are quite apt to exaggerate both as to the size and the number of rattlesnakes in their own bailiwicks. Ed has had to put up with this minor irritation for a long time. He says that if you get three Texans together and show them a big rattler at least one of them will tell you, "Why, that's just a small one!" Ed was particularly annoyed one time when he got a rattler that measured five feet eight inches, a remarkable length, by the way. Ed showed this snake to some of the men who saw him on his way in and was met with the usual, "That's just a small one." Some of the men even claimed that if he would come around their ranches he could get specimens that were eight feet long. That irked Ed, so he said that, although he wasn't a rich man and although he gave all the specimens he collected to institutions, he would be willing to pay five dollars for every specimen over six feet long. Ed said he has never heard from one of those men since. As he pointed out, there's nothing like a steel tape to shrink a rattlesnake.

To obtain some precise information as to where we might get the barking frog, we stopped to talk to Mrs. Roy Quillin, directress of the Witte Museum in San Antonio. She suggested that we try the Prade Ranch, located on the headwaters of the Rio Frio in Real County. The Prade Guest Ranch occupies about 10,000 acres on the southern limits of the Edwards Plateau. Mr. Earl Prade very kindly allowed us to stay on the ranch that night and directed us to an old cabin at a point about eight miles from the ranch house where he thought we might be successful in getting the frogs. The eight miles from the ranch house were the most interesting miles traveled on the entire trip. For about six of these the road runs in the stream bed of the Rio Frio itself. The Rio Frio is a spring-fed stream that has cut vertically down through the limestone so that it runs between sheer canyon walls of about 100 feet. Since the stream has now begun to cut sideways, the lower 25 feet of the canyon

walls are undercut. This undercut portion is plastered with the globular mud nests of cliff swallows.

The actual business of collecting barking frogs didn't start until after dark when they first began to call. Although none of us had any previous experience with this species, there was not the slightest doubt in our minds as to what animal was the author of that call. The first one we heard was across the main canyon, but we decided to try a small branch first. After about ten minutes of walking up the bed of the branch, we were rewarded by hearing two barking frogs calling within 50 feet of each other. The method of stalking the barking frog is the same as that used for stalking any frog except for the details of the actual capture. What we did was to concentrate on one voice and approach it until the frog stopped barking. At that time we stopped, turned out our flashlights, and waited quietly. After a few moments, and sometimes after a more considerable wait, the frog began to call again. We advanced a little farther. The frog stopped; we did too. This process was repeated about six or seven times until finally Mr. Schmidt caught sight of the frog in the beam of his flashlight. It was sitting at the opening of a crevice about ten feet from the branch canyon rim. As soon as the light hit it, the frog backed into its crevice.

We had learned that afternoon how deep some of the crevices in the canyon walls could be by trying to catch lizards that had ducked into them. Consequently we were afraid that we were in for a hard and possibly fruitless task of prying and digging. We scrambled up to the crevice and looked in. Squatting in the beam of the flashlight was our clay-colored barking frog with its broad flat head and very prominent eyes.

We were relieved to see that the crevice was only about two feet deep. A little maneuvering and we had him! In about half an hour, by repeating this process, we were able to get the other frog.

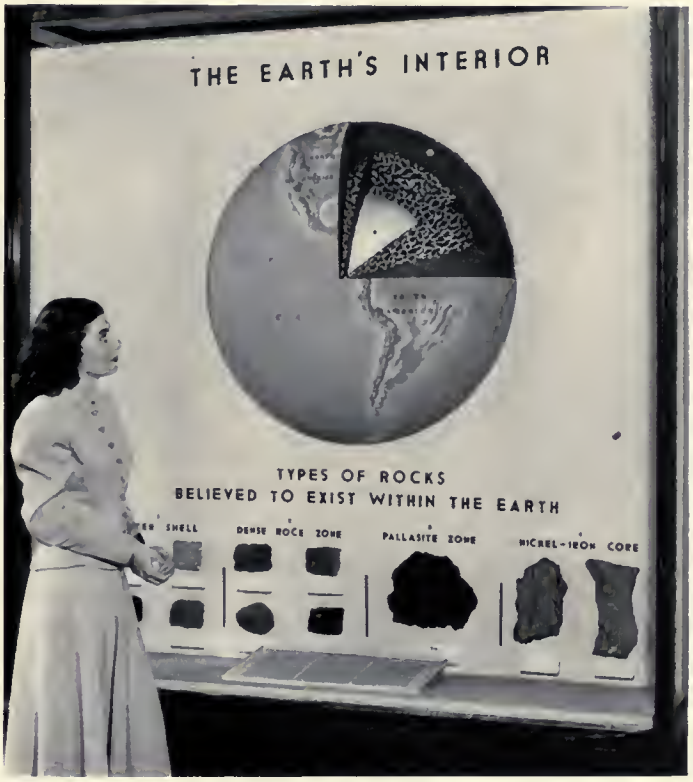
Although securing the barking frog was really the highlight of our stay at the Prade Ranch, Mr. Prade aided us in obtaining quite a few species of other amphibians and reptiles. Of these the most noteworthy was a species of neotenic salamander. Neotenic salamanders are those that retain certain larval characteristics, such as external gills, and are consequently obliged to spend their entire life-cycle in water. This locality represents an extension of the known range of these salamanders 100 miles westward.

The barking frogs we obtained represented the first of that species in the collections of the Division of Reptiles. Although we were unable to make any observations of their breeding habits, we hope to be successful in future trips. The distribution of the neotenic salamanders represents another problem for further study in the region of the Edwards Plateau.

A QUICK PEEK INTO THE INTERIOR OF THE EARTH

By SHARAT K. ROY
CHIEF CURATOR, DEPARTMENT OF GEOLOGY

The earth has a radius of nearly 4,000 miles. Of this, no more than five or ten miles has been seen by direct observation. What lies beyond? What are the materials and conditions that exist at great depths? Does the density and composition of rocks change with depths? Is any large part of the interior in a liquid state?



220 MILES TO THE INCH

That's the scale of model illustrating the principal features of the interior of the earth, on exhibition in Clarence Buckingham Hall (Hall 35). Miss Joanne Neher of the Department of Geology staff is shown inspecting it.

To illustrate what is known of the answer, a new model of the interior of the earth has been constructed and placed on exhibition in Clarence Buckingham Hall (Hall 35) of the Department of Geology.

Our chief sources of knowledge concerning the interior of the earth are the average density of the earth and the varying velocities with which earthquake shocks are transmitted through the earth at different depths. The average density of the earth as a whole is 5.5. No surface rock with which we are familiar has a density much above 3, and the average density of surface rocks, using rocks of all kinds, is only 2.7. As this is less than half the density of the whole earth, the interior must consist of much heavier material than the outer part. The density change from the surface to the center is due either to the presence of intrinsically heavier material toward the center or a diminution in volume of surface-type rock caused by the tremendous pressure existing at great depths.

Doubtless, this pressure has an effect in compressing the deeper material, but from the behavior of earthquake waves it is unlikely that the surface-type rocks can be compressed sufficiently to give the high average density of the earth. If the entire earth were composed of such rock, the speed of transmission of earthquake waves should increase with depth at a nearly uniform rate, so long as the material remains rigid.

This is not the case, however. There are irregularities in the rate at which the speed of earthquake waves increases downward, indicating that at and around the center there is a considerable amount of heavier material, presumably some metal such as meteorites, the majority of which are composed of iron and nickel with an average density of about 8. The sum of evidence supports the view that the earth has a "density stratification," with the heaviest material near the center and the lightest near the surface.

Instead of a thin crust over a molten interior as was once believed, the model, which is made on a scale of 220 miles to one inch, shows an earth composed of several concentric layers of rocks of increasing density. The outer layer consists of lighter, granitic and related rocks. This is underlaid by a dense rock zone composed of rocks, such as gabbro and peridotite. Beneath this is the pallasite zone, a mixture of compounds of metallic and stony materials. The core or the innermost layer, as has been stated, is composed of an alloy of iron and nickel.

The problem of the earth's interior has not yet been conclusively solved. The model shown here presents only the information known to us. Further advances in the field of geophysics may provide a more satisfactory and accurate conception.

The model was made by Mr. Joseph B. Krstolich, Museum artist, and Mr. John Janacek, former staff illustrator.

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Members are requested to inform the Museum promptly of changes of address.

SOME LITTLE-KNOWN MUSEUM SERVICES

Chicago Natural History Museum represents a source of information that is almost unique in this city. Publishers, advertisers, radio stations, artists, and writers draw constantly on the Museum for information or sources of information on zoological, botanical, geological, or anthropological subjects that they are preparing to present to the public in various forms. The Museum is rather widely known among a limited group for this type of service.

Besides supplying information, the Museum acts in a training capacity for foreign students. In recent years the Department of Zoology has trained in museum methods students from Egypt, British Guiana, and Peru, all sponsored by their respective governments. They return to their countries better able to present, through modern methods of taxidermy and by their knowledge of the literature, phases of natural history of both popular and economic interest.

Another service, minor perhaps, but of extreme importance, is that of advice to young students of natural history. Some boys and girls, many still in grammar school, feel that unexplainable urge to learn more about birds, mammals, reptiles, insects, fishes, or invertebrates. They feel that they want to devote their lives to some study of natural history but are often at a loss to know what courses to take or what university or college to attend. The Museum's curators have special knowledge of what the possibilities are, depending on the student and his particular interest. Later on, temporary or volunteer work is sometimes found in the Museum for especially worthy individuals, which gives them further training and background.

The Museum is, of course, an educational institution with a broad field, and its services extend help in a great variety of interests. Actually, the field of systematic studies of plants, animals, and fossils, is basic to the whole science of biology.

COLIN CAMPBELL SANBORN
Curator of Mammals

STAFF NOTES

Mr. Clifford H. Pope, Curator of Amphibians and Reptiles, left late in June for Mountain Lake, Virginia, where he will make his headquarters at the Mountain Lake Biological Station of the University of Virginia to continue his researches on the remarkable salamander fauna of the southern Appalachians. Mr. Pope began these investigations, of the richest and most varied salamander fauna in the world, two years ago at Highlands, North Carolina. . . . **Mr. John W. Winn**, Assistant Curator of Fishes, resigned from the Museum staff as of June 16 to accept a position as Aquatic Biologist with the Fish and Wildlife Service of the U. S. Department of Interior. He will be engaged in Missouri River Basin studies, with headquarters in Kansas City, Missouri.

Mr. Gustaf Dalstrom, artist, Department of Anthropology, was awarded the Mr. and Mrs. Frank G. Logan Art Institute medal and $500 for his "Portrait of a Woman" entered in the 52nd Annual Exhibition by artists of Chicago and vicinity. This was the top prize of all those offered for this exhibition. The exhibition opened at the Art Institute June 16 and will remain on view through August 15. . . . **Mr. George I. Quimby**, Curator of Exhibits in the Department of Anthropology, has been elected as the Vice-President of the Central States Branch of the American Anthropological Association.

Mr. J. Francis Macbride, Curator of Peruvian Botany, returned from his leave of absence to work at the Museum for a short time, in connection with his *The Flora of Peru*. . . . **Dr. Hugh C. Cutler**, Curator of Economic Botany, gave a lecture on "Plants and People of Bolivia" at the Anthropology Club of the University of Chicago on June 14.

Some of the most curious forms of animal life are those that may be seen in Hall M—the marine invertebrates: sponges, sea urchins, sea stars, corals, etc.

Guatemala Expedition Progress

Mr. Rupert L. Wenzel, Assistant Curator of Insects, returned recently from the Guatemala Zoological Expedition. Until that time the expedition worked chiefly in the vicinity of Volcan Fuego and Volcan Acatenango, with headquarters in San Pedro Yepocapa. The remaining members of the party—Mr. Luis de la Torre and Mr. Rodger Mitchell—are at present living and working in the large cave at Lanquin in Alta Vera Paz. There has been considerable speculation as to whether or not this cave supports a true cave fauna; preliminary reports from the field indicate that it does not. To date, the collections of mammals and insects have been gratifying. Included are a number of mammals that were either previously unknown from Guatemala or known from only one or two records.

Birds as Solar Machines

(*Continued from page 3*)

action. In many birds the stomach walls are thin and the stomach is not thickened into a gizzard.

From the stomach the food passes into the intestine where the usable portions are extracted, and waste material is expelled through the anus. The resulting nutritive substances are used by the bird either for its growth or for the production of the energy required for its daily life.

The exhibit was planned by the Division of Birds and executed by Staff Taxidermist Leon L. Pray and Mr. Kenneth Woehlck.

NEW MEMBERS

The following persons became Museum Members between May 17 and June 15:

Contributors

Dr. José Cuatrecasas, Harry Hoogstraal, Karl P. Schmidt.

Associate Members

Bryan B. Biggers, Frank M. Opeka, Sanger P. Robinson, Thomas A. Schutz, Joseph G. Sola, George P. Torrence.

Annual Members

Mrs. M. Lee Alberts, John Ashenhurst, Dr. E. H. Blair, Edson M. Brock, Frank J. Calvin, Chester J. Clark, Wilford R. Diercks, Alex Elson, Nathan Fisher, Egington Franklin, Charles V. Gary, John N. Giblin, Theodore B. Gudis, Frank M. Haynes, Charles I. Horowitz, Elbridge Keith, Paul G. Kimball, O. N. Koenig, Maxwell Landis, Joseph S. Langer, Edward M. Loeser, Edward C. Logelin, Jr., Vincent P. Manno, Creighton S. Miller, Charles A. Mortimer, Walter Headden Ogden, William R. Prada, Dr. Fred A. Replogle, Milton Reynolds, Harold F. Scovel, A. T. Seaholm, Joseph L. Sheppard, Gaylord C. Whipple.

In Hall 32 is an exhibit showing Chinese school children, their books, and samples of their drawing and painting.

FOSSIL FACTS AND FANCY: SOME CARPENTERS' TOOLS SIMULATED IN NATURE

By EUGENE S. RICHARDSON, JR.
CURATOR OF INVERTERRATE FOSSILS

PERHAPS, while Frederick J. V. Skiff Hall (Hall 37) is temporarily closed for remodeling, occupied by carpenters and their diverse tools, we may be pardoned a lapse into fantasy regarding its usual occupants, the invertebrate fossils. It couldn't be that the workmen are using some of those strange-looking remains that seem so little like the more familiar modern animals, could it?

On this page are pictures of some of the fossils that are supposed to have left the room to go into quiet retirement during the construction of their new cases. At least, we *thought* they had left the room. But maybe they're right in there helping. Take another look at those pictures. Don't the forms of many of these fossils bear striking resemblances to various tools and items used in carpentry?

There seem to be several kinds of screws in our collection, big, small, and middle-sized. One is *Daemonhelix*, six feet high—like a huge lag screw used in building a bridge or a pier. According to the label, it is the filling of a cavity left where a curly stemmed tropical vine, a liana, was buried in a river flood-plain and rotted away. Timid little animals lived for a while in the hollow; then more river-borne sand filled it up and turned into sandstone over the centuries. Finally this accumulation weathered out of a hillside as a screw-shaped column of stone and was brought here for exhibition. Many varieties of pitch and thread, diameter and length, such as are found in steel and brass screws, occur also in specimens that once were snails (*Figure 1*); and the aptly named *Archimedes* (*Figure 2*), a bryozoan of Mississippian age, looks as if it could hold anything together firmly.

Fig. 1

Fig. 2

Numerous specimens seem to be potential plumb bobs that would assure us the walls of the new hall would be admirably vertical, if they were to be used. The carpenters could take their choice, from an *Endoceras* (*Figure 3*) for use in tight quarters to a *Conularia* (*Figure 4*) or an *Apiocrinus* (*Figure 5*) where there is room for a large one.

Fig. 3

Fig. 4

Fig. 5

The *Endoceras* is the shell of an Ordovician nautiloid; its modern relatives, such as the pearly nautilus, are coiled, but *Endoceras* represents the primitive form of these shells, before coiling became the fashion.

Ranging from the Ordovician to the Jurassic, *Conularia* is a puzzle to paleontologists, some believing it to be a gastropod, others a scyphozoan, and others a worm-tube. It is the only four-sided cone-shaped shell in the animal kingdom, and a right good plumb bob. The *Apiocrinus* specimen consists of the calyx and enlarged upper stem-plates of a Jurassic crinoid (see "The Ubiquitous Crinoids, Layman's Fossils," BULLETIN, March, 1948).

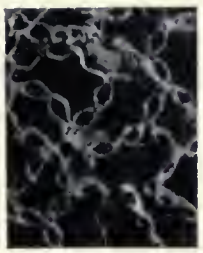

Fig. 6

To go with plumb bobs, chains might be needed. Among the Silurian invertebrates we have a fine chain-coral, *Halysites catenularia* (*Figure 6*), whose name comes from the Greek αλυσις (*halysis*) and the Latin *catena*, both words meaning "chain." Each small link in this animal-built chain is the cavity once occupied by a coral polyp.

Fig. 7

When Superintendent of Maintenance James Shouba drafted the plans for the new construction, he probably needed a French curve. He might almost have used our specimen of the small, curiously wrought *Monograptus* (*Figure 7*). This is a Silurian graptolite, the delicate protective covering of a strung-out colony of very tiny creatures, probably related to the Pterobranchs, and here preserved as a black film of carbon on a black shale.

KEY TO FIGURES

Fig. 1. Turritella, a Pliocene snail, about half natural size.

Fig. 2. Archimedes, a Mississippian bryozoan, natural size.

Fig. 3. Endoceras, an Ordovician nautiloid, about one-third natural size.

Fig. 4. Conularia, a Mississippian puzzle, about two-thirds natural size.

Fig. 5. Apiocrinus, a Jurassic crinoid, about half natural size.

Fig. 6. Halysites, a Silurian chain-coral, slightly magnified.

Fig. 7. Monograptus, a Silurian graptolite, about half natural size.

Fig. 8. Two specimens of Blothrophyllum, a Devonian coral, about one-third natural size.

Fig. 9. A spine of Cidaris, a Miocene sea urchin, about half natural size.

Fig. 10. Ischadites, an Ordovician sponge, about one-fourth natural size.

INK AVAILABLE, TOO

Even ink for the working drawings might have been obtained from one of the specimens of Jurassic belemnites. These animals, related to our present-day squids, had an ink sac with which to cast a protective "smoke screen" when frightened, and that ink simply dried up and was preserved along with the harder parts of the belemnite when it became a fossil. With the addition of a little water, it is still as good as new.

Fig. 8

Any carpentry job is likely to call for files, and we can paraphrase a current advertisement in pointing out that "there's a fossil file for every purpose." We have a variety of rat-tail files that appear usable for enlarging drilled holes. Look at *Blothrophyllum* (*Figure 8, right*), from the Devonian—there's a good, fast-working file for you. This is a coral that lived a series of lives on the Devonian sea floor near modern Louisville. The polyp that started building the limy structure in our collection built only the pointed basal end; then it withered and produced a "bud." The bud grew to complete coralhood in the cup built by its parent, building its own cone within the first one, and then it withered in its turn and was succeeded by another budded coral. The present structure is the product of fifteen such incarnations, the rims of the successive cones projecting one above and within another in satisfactory imitation of a file.

For finer filing, consider the spines of a *Cidaris* (*Figure 9*), a Miocene sea urchin. A somewhat ball-shaped creature with a limy covering, it was protected by a multitude of rough-surfaced spines, some even longer than the body itself. *Ostrea carinata*, a Cretaceous oyster, resembles a flat file. This is the "ruffled" kind of oyster, with sharp transverse ridges on its shell, that makes wading so unpleasant on some modern beaches.

Fig. 9

There are also natural funnels—many of the Devonian cup-corals could serve this purpose. Another *Blothrophyllum* (*Figure 8, left*) has a suitable shape (though it isn't really hollow) and its growth hasn't been interrupted by rejuvenescence, the process whereby successive polyps came to occupy the structure of the other. *Ischadites*

(*Continued on page 8, column 1*)

FOSSIL FACTS AND FANCY

(*Continued from page 7*)

(*Figure 10*), tucked in among the Ordovician sponges, should be a good sieve to use with the funnel. A flattened ball-shaped sponge, with radial pores and spicules through the outer wall arranged like the seeds of a sunflower, this animal that lived like a sieve should serve as one to perfection now.

Fig. 10

The collection of fossil invertebrates includes many other odd-looking things resembling utilitarian objects, such as washboards, swords, daggers, pincushions, war clubs, ash trays, and needles. But all are "direct traces of prehistoric life," whose value to us lies in the wealth of information they can give about what the world was like before man. When the exhibition hall is again opened, it is expected that the story they tell will be clearly shown, in terms of life rather than of tools.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

THROW ME A BONE. By Eleanor Lothrop. Whittlesey House, New York, 1948. 234 pages. 22 full-page illustrations. Price $3.

Some years ago in preparing a popular lecture on our excavations in southwestern Colorado, I wrote: "Many people think that archaeology is a treasure hunt. Actually, it consists of very hard labor done under a blazing sun, with plenty of dust and bugs thrown in."

Mrs. Lothrop, also, apparently thought that archaeology is a lark, but she was soon disillusioned.

This book, the subtitle of which is *What Happens When You Marry an Archaeologist*, is concerned with the author's own experiences in Chile, Guatemala, and Panama as an archaeologist's wife. As such, she was imbued (at least on her honeymoon trip to Chile) with a burning desire to help her husband become a famous archaeologist. By bungling and by breaking so many of the rules of the "game," she soon found that her most useful role was in staying out of her husband's way. Helping an archaeologist requires skill and training, and without these a greenhorn is a positive nuisance—a fact that the author makes amusingly clear.

In Chile, where her husband undertook some archaeological excavations and some investigations of the mode of life of modern Indians, Mrs. Lothrop found out that grubbing around old refuse heaps (the delight of archaeologists) was not at all like discovering King Tut's tomb. Furthermore, the daily existence of the archaeologist is not a picnic but is carried on from a simple camp or a mediocre hotel without any of the so-called modern conveniences.

In Guatemala, the Lothrops excavated a site in spite of the hostility of the Indians and under many difficulties.

Panama, where the Lothrops excavated a series of graves containing many gold ornaments as well as quantities of pottery and tools, is probably the high spot in the author's narration. Because of her experiences on other field trips, she was most useful to the expedition.

Mrs. Lothrop's story is told with great vigor, a vast amount of penetrating humor and sarcasm, and an informal but most readable style.

The author completely debunks the glamorous side of archaeology (and it is high time!) and purposely wishes to shock the dreamer who sits in an armchair and yearns for adventure. She emphasizes the point that "archaeology is wonderful." She might well have added that archaeology today is not concerned merely with finding specimens but that it is an attempt to understand social behavior and the mechanics of social change in simpler, less complex societies that left no written records.

I enjoyed this book and would recommend it to anyone who is thinking of going into archaeology because he thinks it is an "adventure." The layman who is genuinely interested in archaeology will also find the book absorbing; and the professional archaeologist will derive many a chuckle from it.

PAUL S. MARTIN
Chief Curator of Anthropology

SUMMER LECTURE TOURS TWICE A DAY

During July and August, conducted tours of the exhibits, under the guidance of staff lecturers, will be given on a special schedule, as follows:

Mondays: 11 A.M., Stories in Stones (survey of fossils, rocks, minerals, and gems); 2 P.M., General Tour (exhibition halls, all departments).

Tuesdays: 11 A.M., Our Living Plants (survey of all kinds of plants); 2 P.M., General Tour.

Wednesdays: 11 A.M., Animal Tales (general survey of animals); 2 P.M., General Tour.

Thursdays: 11 A.M. and 2 P.M., General Tours.

Fridays: 11 A.M., World Neighbors (general survey of people and places); 2 P.M., General Tour.

There are no tours given on Saturdays and Sundays, or on *Monday, July 5 (celebrated as July Fourth holiday)*.

SUMMER MOVIE PROGRAMS FOR CHILDREN

The annual Summer Series of motion picture programs for children will be given on Thursday mornings during July and August beginning July 8. The series, consisting of six programs, is presented under the auspices of the James Nelson and Anna Louise Raymond Foundation. On one program, that of July 29, in addition to films there will be a demonstration of the use of puppet figures with a story told by June Buchwald; likewise, on the August 12 program, Harriet Smith will tell a story to accompany the films of an African animal hunt. Two programs, July 22 and August 5, will have animated cartoons as well as feature pictures.

The entertainments will be given in the James Simpson Theatre of the Museum at 10:30 A.M. Children are invited to come alone, accompanied by parents or other adults, or in groups from clubs and various centers. Admission is free. Following are the dates and titles of the films:

July 8—CHATA
Story of a little Mexican girl and her family in the tropical paradise of Tehuantepec, Mexico.

July 15—THE OPEN ROAD
A vacation in our State Parks of Illinois.

July 22—THROUGH THE GRAND CANYON BY BOAT
Also a cartoon.

July 29—THE LITTLEST THEATRE
Puppets and Shadow Plays, old and new.
Story told by June Buchwald.

August 5—THUNDERING WATERS
Niagara Falls.
Also a cartoon.

August 12—SIMBA
African pictures taken by the Martin Johnsons.
Story told by Harriet Smith.

Too Many Species!

Although it possesses one of the most comprehensive zoological collections ever assembled and is continually adding to it, this (or any other) Museum could never hope to display an actually complete representation. The reason is readily apparent when it is considered that there are more than 50,000 species of mammals, birds, reptiles, amphibians, and fishes, while the insects, mollusks, crustaceans, and other invertebrate types run into hundreds of thousands. No museum could show all.

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BULLETIN
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Chicago Natural History Museum

'Gigantic Spark' . . .

THUNDER — LIGHTNING: CAUSES AND EFFECTS

By SHARAT K. ROY
CHIEF CURATOR, DEPARTMENT OF GEOLOGY

LIGHTNING, a spectacular, and not infrequently a frightening phenomenon of nature, is but a gigantic electric spark. It is most fitting that the cover photograph of this month's BULLETIN should be that of a magnificent flash, for August is a month when one may hear thunder crack and rumble and see big bolts of lightning shimmer across the sky.

The resemblance between lightning flashes and electric sparks was recognized almost 200 years ago, when Benjamin Franklin performed the celebrated experiment of obtaining electric charges by means of a kite. One day in June, 1752, at the approach of a thunderstorm, Franklin sent up a kite which was provided with metal points. To the lower end of the kite-cord, he fastened a key. The cord was insulated from the earth. When the cord became wet. so that it could conduct electricity, Franklin obtained sparks from it. The sparks were found to be similar in character to the electricity produced by friction.

ACTIVATING FACTORS

Observations indicate that the under surface of a thunder cloud has a negative charge, while the top is positive. When lightning takes place the current is from earth to cloud. Under several million volts of potential difference between the earth and clouds, a relatively small flash, or a "leader" flash, plunges earthward, and then a bigger flash moves up from the earth to the clouds. This growth of the flashes is believed to be due to ionization by collision. Though of short duration, the total ion current may attain hundreds or thousands of amperes.

THEORIES NOT CONCLUSIVE

The cause of the great difference of potential between the clouds and the earth during thunderstorms is not clearly understood. Some hold that it may be due to evaporation, some to condensation, others to friction between air and water particles. None of these theories, however, has been conclusively proved by experimentation.

Thunder is caused by sudden expansion of the air due to great heat occasioned by the flash. The continued rumbling of thunder after the usual sharp, sometimes deafening, initial report is due not only to echoes from hills and clouds but also to the fact that often one end of the flash is many hundreds of feet further away than the other. The time that elapses between the lightning and the thunder can be used as a gauge to measure the distance to the nearest point of the flash. Roughly, the distance is a mile to every five seconds.

'PETRIFIED LIGHTNING'

The heat of the flash is indeed very great, as evidenced by destructive fires, and by the formation of fulgurites or "lightning tubes" (*see illustration*). The term comes from the Latin *fulgur*, meaning lightning. When lightning strikes the surface of the earth and encounters rock or sand, portions of the encountered material are fused by the heat of the flash into a mass of pointed, irregular glassy rock, usually in the form of a tube, at times with a bead-like structure. The tube begins at the surface and continues downwards until the power of the lightning stroke is dissipated through the surrounding material.

Fulgurites are especially frequent on exposed crags, mountain tops, sand dunes, trees, and the like, for electric charges induced on the earth by passing thunderclouds are greatest in tall, projecting objects. Usually, the leaves of trees conduct the charge from the earth and prevent the "striking" of lightning.

This suggested to Franklin that a pointed conductor—the now familiar lightning rod—may serve the same purpose for homes and barns. The rods are seldom struck, for during a thunderstorm, they discharge an abundant supply of ions from the points connected to the ground in moist earth, thus neutralizing the excess electric charge overhead. If lightning does strike, it is conducted to the ground without destructive discharge, providing the rod is not defective and contact with the ground is good.

'PETRIFIED LIGHTNING'
Fulgurites or "lightning tubes" composed of sand or rock fused by the heat of a flash. On exhibition in Clarence Buckingham Hall (Hall 35).

—THIS MONTH'S COVER—

Lightning—one of nature's most beautiful phenomena—is a difficult subject for photographers. Speed and skill are required to catch it at the climactic instant of the flash. Among more than 90,000 negatives of nature subjects at the Museum, only one lightning picture could be found. It is an especially good one, however, the more so when it is considered it was made about 1908 before the development of modern photographic equipment such as can be used today. Unfortunately, the picture is something of a mystery—no record exists as to who made it or what is the locality of the scene.

LIGHTNING AS A HAZARD

During July, several persons in the Chicago area were injured by lightning and at least one of those struck died, according to accounts in the local press; in Connecticut, the Associated Press reported, locomotives of two commuter trains were struck, but no one was injured.

"True, lightning is not one of our major hazards, but, for all that, hazard enough to command respect—400 lives and 1,000 injuries a year in the United States alone, and around $20,000,000 in property damage. . . .

"If one is caught in a thunderstorm, then what? Come in out of the rain, if you can, or get in a canyon, or under a cliff, or in a cave (best of all); in any case keep away from isolated trees in open spaces, avoid the crest of a hill, and never get closer than 100 feet, at least, to any wire fence, as you might be struck by lightning that hit the fence half a mile away."

From *Ways of the Weather*. By W. J. Humphreys, Ph. D., Sc. D., U. S. Weather Bureau. Jacques Cattell Press, Lancaster, Pennsylvania. 400 pages. 75 illustrations. Price $4. (On sale at The BOOK SHOP of the Museum.)

Scientist from Norway

Dr. Erling Sivertsen, Curator at the Zoological Museum of Trondheim, Norway, and Mrs. Sivertsen were Museum visitors in July. Dr. Sivertsen examined and listed the Museum's collection of South American seal skulls.

CHAMELEONS—A STUDY IN ADAPTATION AND IN ORNAMENT

By KARL P. SCHMIDT
CHIEF CURATOR, DEPARTMENT OF ZOOLOGY

SHORTLY before World War II, a living specimen of the remarkable lizard known as the common chameleon, native to the borders of the Mediterranean, reached the Museum as a gift from Dr. Georg Haas, my colleague in herpetological studies at the Hebrew University in Jerusalem. The chameleon of North Africa and Palestine is the species known to classical antiquity and is the typical chameleon in the sense that it was the first of the numerous species to become known to the learned world.

PORTRAIT
The East African Mountain Chameleon, Chamaeleo bitaeniatus hoehneli.

Our specimen lived for nearly two years in the laboratory of the Division of Reptiles. Its structure and behavior were so extremely interesting that it served the peculiar function of arming us against such Philistine visitors as are unable to understand the lifelong interest of the zoologist in animals, and think of him as being in some way abnormal. In the chameleon are combined a marvelous capacity for color change, goggle eyes focusing separately on the proffered spider and on the visitor, slow motion stalking of prey as it moves along a twig with tong-like feet, and the contrast of the lightning shot of the projectile tongue that picks up a spider at 10 inches' distance when the lizard itself is only 6 inches long. Our laboratory chameleon proved, in fact, to be as interesting to the casual visitor from any walk of life and any age as it was to the zoologist himself. We were often rewarded, after a demonstration of the chameleon, with the remark, "No wonder you are interested in studying such creatures."

Our Jerusalem chameleon had been six weeks en route by ordinary mail, and in spite of the ability of reptiles to survive long fasts, arrived in so emaciated a condition that we were fortunate to be able to nurse it back to normal activity. With the establishment of world-wide air transport systems, zoologists could not fail to think of the new facilities for the acquisition of strange small creatures from the far corners of the earth, and by way of setting an example, the Museum had obtained a few West Indian reptiles by this means in 1944. Remembering our chameleon especially, no traveler to Africa who had any contact with the Museum escaped the request to try a shipment of chameleons by air express to Chicago.

The first successful shipment, marked by the safe arrival of 27 chameleons at the Museum on June 25, 1948, resulted from a request to Mr. Harry Hoogstraal, who is attached to the staff of the Naval Medical Science Group of the University of California African Expedition. Mr. Hoogstraal, of the Museum staff and recently leader of the Museum's Philippine Expedition of 1946–47, is on loan to the Naval Medical Science Group to conduct certain special projects.

The chameleons were desired for critical studies of behavior such as have proved extraordinarily fruitful in university research programs, but they do not represent an engagement of the Museum in the field of animal behavior. The Museum's interest lies in making use of its knowledge of the world fauna to fertilize and vary the studies of the specialists in this relatively new field of study, and in maintaining a contact of its staff of naturalists with such researches. The chameleons now available are being studied by Dr. Bernard Greenberg of Roosevelt College, whose training has the background of studies with the late G. K. Noble of The American Museum of Natural History in New York and with Professor W. C. Allee of the University of Chicago. He is assisted by Miss Mary Weaver, of Glen Ellyn, a student at Carleton College, who is a volunteer at the Museum for the summer months.

As to the chameleons themselves, they represent the subspecies *Chameleo bitaeniatus hoehneli* of the mountains of Kenya Colony, East Africa, one of a series of forms found on high mountains from Abyssinia to the Ruwenzori. Almost identical in scale characters and head-form from specimen to specimen, there were no two alike in coloration when they were removed from their shipping crate.

EMOTION—LIKE A BLUSH

Mottled brown, plain brown, solid livid green, gray with yellow stripes on each side, almost black, boldly red spotted, and various combinations of these patterns and colors were represented. Still more remarkable, each chameleon may change its color from hour to hour and from day to day. It is

Photo courtesy Chicago Daily Tribune

PHENOMENAL TONGUE
Chameleons are "dead shots," and "quick on the trigger" with their projectile tongues when prey crosses their otherwise slow path. Just as quick was a newspaper photographer, Mr. Robert Mackay, who by instantaneous action was able to make this remarkable picture before the end of the jiffy in which the body-long tongue vanished with its quarry.

thought that these color changes (from which the word "chameleon-like" in the sense of "changeable" is derived*) are governed in part by background resemblance and in part by emotional reactions such as anger and fear. Actually, much remains to be learned and recorded about the factors that govern such elaborate color change.

One of the most evident features of living organisms is their adjustment for particular modes of life, and one of the principal modes of evolution has been the hereditary fixation of such adjustments in whole groups and their progressive further improvement and elaboration. Secondarily, any great evolutionary adjustment may be the starting point for a whole new series of species that run the gamut of minor variation on the theme of the major adaptation.

The chameleon group supplies an elaborate yet extremely clear example of these two principles of evolution. The whole chameleon organism is focused in sharp adjustment to its place of life, to the availability of abundant insect food, and to its mode of feeding. Entry into bushes and trees commonly carries with it striking adjustments, such as grasping hands like our own, or prehensile tails, like those of the spider monkey. Sure enough, here in the little chameleon we find the neat combination of a flexible tail (too valuable to be fragile and easily lost like that of so many lizards) and the most curious grasping hands and feet. Each foot has five digits, and these are firmly united into bundles respectively of two and three. In the interest apparently of symmetry, the two-toe bundle is on the outside in the front foot (i.e. in the "hand") and on the inside in the hind foot. These two bundles of toes oppose each other as a most effective pair of tongs for grasping a twig or small branch. They are effective for climbing on larger branches by reason of their rough soles and sharp incurved claws.

SLOW MOTION AS NORMAL PACE

The tendency to develop extreme slowness of movements is found widespread among arboreal mammals like the sloths and certain lemurs; in the chameleons it is developed into a fixed mode of locomotion that is extraordinarily effective in the animal's principal activity, namely its search for the often wary insects and spiders that form its food. Any last-minute rush to secure its prey is made unnecessary by the extremely effective projectile tongue, which has a sticky tip. This organ may be shot out, with a motion too rapid for the eye to catch, to a distance considerably greater than the length of the chameleon's body, and with almost unfailing accuracy.

To what extent the separate operation of the eyes is an adaptation to the chameleon's mode of life is not clear, but their large size and apparently binocular use, evidenced by the accuracy of measurement of the distance to which the tongue is to be shot out, are clearly correlated with daylight hunting in which eyesight is the principal sense employed.

All these characters apply completely to every one of the 80-odd species of chameleons, and even to the curious little *Rhampholeon* of central Africa, in which color change is largely given up in favor of dead-leaf "protective resemblance," and to the two bizarre Madagascan genera, *Brookesia* and *Leandria*. Madagascar, by the way, has about half the species of the genus *Chameleo* including a two-foot long giant form. Arabia has two species, Peninsular India one, and Africa the rest.

Equal in interest to the functional adaptations for a specific mode of life, from the standpoint of the origin of species, are the characteristics by which the species of so compact a group are found to be distinguished. The useful characters above outlined are those of the family Chamaeleontidae. The characters that distinguish the separate species seen to be mainly "useless" —they consist in a bewildering array of ornamentation, sometimes found in both sexes, sometimes only as male structures, and often variously recombined from species to species. Thus there is variation in the size of the scales of the sides, which may be uniformly granular or plate-like or mixed; the scales along the middle of the back may be low or raised or sculptured, and along the mid-line of the chin and belly they likewise often are found to vary greatly—being elongate and beard-like in the Kenya chameleon. High finned crests may be developed either on the back or on the base of the tail. There are very characteristic head shapes, from concave above to fantastically helmeted. Most striking of all is the development of forwardly directed horns—there are one-horned, two-horned, three-horned, and even four-horned chameleons, most with smooth horns, but some with scaly horns.

Variation in the Fundamental Chameleon Type Has Gone to These Extremes

Drawings by Margaret G. Bradbury

Chamaelio dilepis of West Africa — Chamaeleo fischeri of Tanganyika — Chamaeleo jacksoni of Kenya — Chamaeleo calyptratus of Arabia

FIELD FOR RESEARCH

It is expected that when the behavior of chameleons is studied by modern methods that these "ornamental" characters will be found to have some significance in the life of the species, in species recognition, sex-recognition, or, in combat between males.

Behavior studies of our Kenya chameleons may begin at an appropriate beginning, namely at birth. Two days after their arrival in Chicago, and while we were discussing the provision of suitable sand or earth for possible egg-laying, one of the females gave birth to thirteen living young.

Less than a minute after birth, each had wriggled out of its foetal membranes and immediately climbed upon the nearest object, often its own mother. Unfortunately, the mother seems to lack parental instincts for she promptly detached her clinging babies with vigorous swipes of the hind legs.

Although of edible size, the young aren't eaten or harmed, even when climbing over the very jaws of the older chameleons. At birth, they are fully equipped with the extraordinary patterns of locomotion and feeding typical of this remarkable lizard, and are able to fend for themselves without a

(*Continued on page 6, column 3*)

*The use of the name "chameleon" for the little iguanid lizards from the southern United States (and sometimes for a species from Cuba) is of course similarly derived from the ability to change color; but to be "chameleon-like" is scarcely to be a chameleon. Zoologists much prefer to use the term "anole" for these American lizards which often have been sold for a few cents apiece at pet shops, circuses, county fairs, etc.

COCAINE IN SOUTH AMERICA SOLD LIKE CHEWING GUM

By HUGH C. CUTLER
CURATOR OF ECONOMIC BOTANY

Drug plants and narcotics are usually associated with the Orient, yet a large part of the people living in the Andes of Ecuador, Peru, Bolivia and near-by countries of South America use cocaine daily. The cocaine plant is one of the New World cultivated plants which were studied by the Museum's Desloge 1948 Peruvian Botanical Expedition.

Most species of the genus Erythroxylon are natives of South America, while a few others grow in Africa and southeastern Asia. However the drug is obtained from the Peruvian and Bolivian species, *Erythroxylon coca*, cultivated for this purpose. Like rubber, tapioca and cashews, cocaine is now grown in the East Indies from New World seed. By careful handling and by selection of high drug-yielding varieties, the amount of cocaine alkaloids in the leaves of the East Indian plants has been increased so that they now yield nearly twice as much as leaves taken from average plants in South America. This case is similar to the history of rubber in the Orient. Improvements in culture methods and plant-breeding in rubber made in the Far East now yield larger quantities of more uniform and cheaper rubber than the methods in use in the New World.

PROCESSED LIKE TEA

The coccaine plant is cultivated and harvested much like tea. Nursery-grown seedlings are transplanted to terraces on the moist slopes of semi-tropical valleys. The leaves are picked when they are fully grown. Unlike tea, the terminal clusters of leaves and the very young ones are not taken. After picking, the leaves are spread out to dry in the sun and are turned every hour. In parts of the Andes, a barefooted worker stamps on the leaves when they are fresh. This flattens the leaves and bruises them slightly so that they dry quickly. During the rainy season the leaves are dried in special sheds on bamboo racks below which a low fire is kept burning. When the leaves are completely dry they are tightly packed in homemade sacks or pressed into small bales.

Most of the cocaine leaves produced in South America are used locally. A large part of any marketplace is occupied by vendors of the leaves. So general is the use of the leaves that many big farms pay a large part of wages with such leaves. The leaf-chewing habit is spreading in South America. During the recent Chaco War between Bolivia and Paraguay, leaves were distributed to the Bolivian soldiers and now the Indians of the Chaco have learned the habit. Improved transportation, by trains and trucks, has allowed many workers to learn about the use of the leaves and made it easier to secure them. On the other hand, an increasing number of natives abandon the habit after they are educated or after they work awhile in the larger towns. Increased labor costs and the spread of plant diseases in the cocaine plantations have raised the cost of the leaves. The increased cost often discourages the habit. But since chewing the leaves deadens the pangs of hunger, workers buy less food and become weak and susceptible to disease.

'MAGICAL USES'

Most of the leaves grown in the New World are chewed. Only a limited amount is devoted to extraction of cocaine used in medicine, especially as a local anesthetic.

SOCIAL COMMENTARY

As shown in this picture, cocaine leaves are sold openly like any other commodity in all the Andean market places. This scene is in Cochabamba, Bolivia. Also sold are pellets of lime or ash to chew with the leaves—the alkaline helps to release the drug.

Some leaves are used in making tea and in the preparation of soft drinks. An interesting use of the leaves in the area visited by the Desloge Peruvian Botanical Expedition is in divining the location of lost or stolen property. A medicine man casts the leaves onto a smooth piece of ground or on flat stones and then tells, from the pattern in which the leaves fall, where the property can be found. The medicine man is usually paid in leaves.

To chew the leaves several are placed in the mouth and a small piece of lime or ashes mixed with clay is added. The leaves are moved slightly with the tongue and teeth but usually are kept as a quid between the teeth and the cheek. The lime and ashes are alkaline and help to release the drug. Using an alkali in this fashion is a very old trick, for it was practiced in South America long before Columbus arrived. We know this because in prehistoric burials of coastal Peru we often find small gourds with ashes or lime associated with the bags which contain the cocaine leaves. In northern Peru some of the pottery figures of men are shown wearing these bags or taking cocaine leaves.

The use of an alkali with a drug plant is not restricted to South America. Betel nut chewers of the Orient usually chew lime with their nuts. When the Spaniards conquered Mexico, the Indians chewed tobacco mixed with lime to keep them from feeling hunger and thirst on long journeys. And in northern South America and the West Indies, ground seeds of a mimosa-like tree, *Piptadenia peregrina*, are mixed with ashes and snuffed.

FORBIDDEN TO WOMEN

The use of cocaine leaves is a male prerogative. While the common Indian of the Andean highlands is rarely without a quid, the women rarely ever enjoy the pain- and fatigue-dulling solace of the leaves. "For men only" was a common rule for drug plants in many regions.

The black drink or cassine tea of our southeastern United States Indians which is shown in Case 54 of Hall 25 could not be imbibed in some tribes if a woman even saw the pot in which it was prepared. In the jungles of the upper Amazon, women were put to death if they saw the ceremonies surrounding the drinking of a solution of caapi, the narcotic containing *Banisteria Caapi*. And even among our own people in the United States, one realizes upon reflection, only certain forms of nicotine can be enjoyed by women, for social custom limits the use of pipes and cigars to men only.

SUMMER MOVIE PROGRAMS FOR CHILDREN

Two more of the Raymond Foundation's free summer programs of motion pictures for children remain to be given on the first two Thursday mornings of August.

The entertainments will be given in the James Simpson Theatre of the Museum at 10:30 A.M. Children are invited to come alone, accompanied by parents or other adults, or in groups from clubs and various centers. Admission is free. Following are the dates and titles of the films:

August 5—THUNDERING WATERS
Niagara Falls.
Also a cartoon.

August 12—SIMBA
African pictures taken by the Martin Johnsons.
Story told by Harriet Smith.

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Members are requested to inform the Museum promptly of changes of address.

RANK-AND-FILE BIRDS DOMINATE RESEARCH

The occasional discovery of species new to science adds zest to the museum researcher's work, but more frequently his enthusiasm is jogged when least expected by less spectacular though often more important discoveries. For an ornithologist, it may be the receipt of specimens in a phase of plumage either proving or disproving the existence of a previously described form. Sometimes a single specimen collected far beyond the known range of its kind opens up unexplored avenues of research that may lead to an entirely new concept of its relationships. And not infrequently the routine process of studying a general collection in the course of its identification discloses bits of information that collectively add much to our knowledge of the bird life of a region.

A MEXICAN COLLECTION

Such was the case with a collection of 342 birds from the state of Guerrero, in southwestern Mexico, which is the basis of a report soon to be published by the Museum. Since the birds of Guerrero have received the attention of competent investigators for many years past, this small collection was at first regarded merely as a desirable though not particularly interesting addition to the Museum's representation of Mexican bird life. Methodical identification of the 109 species and geographical varieties in the collection revealed none new to science, but interest quickened when it was found that fifteen of the birds had not previously been reported from the Mexican state of Guerrero.

Nine of these were migrants. They serve to emphasize both the need for continued field work in southwestern Mexico and the extent to which various races of North American species are brought together in winter by the funneling effect of the Isthmus of Tehuantepec. An interesting by-product of this study was the accumulation of data suggesting that the pre-breeding activity of female reproductive organs lags far behind that of males in spring but finally undergoes much more rapid development. Clues to an explanation of the phenomenon of migration may eventually be found in the refinement and elaboration of similar correlations between physiological development and various aspects of the seasonal cycle.

BEARING ON EVOLUTION

Collections from areas inhabited by intermediate populations, or birds that combine the characters of two or more related varieties, are of special interest to the zoogeographer and student of evolution. The Guerrero collection repeatedly reflected the influence of elements from the diverse Mexican faunas and those of Central America. For example, analysis of the range and affinities of Godman's Euphonia, a colorful little tanager never before reported in Guerrero, shows that it is intermediate between the white-vented and Lesson's Euphonia and that it is actually a geographical variant or sub-species of the latter rather than a distinct species, as has been supposed since its discovery in 1889.

A study of Guerrero roadrunners produced evidence, by inference, that an intermediate population exists in the adjacent state of Oaxaca. Similarly, two distinct races of burrowing owls, and those of several other species, were found to merge in Guerrero, resulting in a population that can be allocated to either race with equal justification. Information such as this—which increases our understanding of bird distribution and genealogy, the extent of individual variation and modification of populations by related forms—attracts no headlines but is one of the more important products of museum research.

EMMET R. BLAKE
Associate Curator of Birds

Gift to Museum Library

The Library of the Museum has received a collection of several hundred books, pamphlets, and periodicals on entomology, as a gift from the family of the late Charles V. Riley, through his daughter, Miss Thora Riley, of Washington, D.C. Mr. Riley died in 1895. The collection has a high historical value and makes a notable addition to the resources of the Library.

STAFF NOTES

Mr. Miguel Covarrubias, one of Mexico's most noted artists, who is also an ethnologist and archaeologist of note, has been elected to the staff of the Department of Anthropology as Research Associate in Primitive Art. Mr. Covarrubias recently was in Chicago and spent considerable time in conference and studies with members of the Museum department. In addition to his other accomplishments he is especially well-known as an expert in primitive art, and as a writer and teacher.... **Mrs. Dorothy Foss** of the Department of Zoology has been promoted from Assistant, Division of Anatomy, to Osteologist.... **Mr. John W. Moyer,** Chief of the Division of Motion Pictures, is the contributor of the illustrated article on taxidermy in the recent new edition of the *Encyclopedia Americana*, and is a contributor also to the latest edition of the *Encyclopaedia Britannica* and the *Britannica Junior*. The articles are illustrated with photographs taken in this Museum.... **Mr. Clifford H. Pope,** Curator of Reptiles, reports favorable conditions for salamander studies at Mountain Lake, Virginia, the summer station of the University of Virginia. He is actively engaged in examination of salamander distribution as governed by altitude in drainage systems in this region.... **Dr. Sharat K. Roy,** Chief Curator of Geology, and **Mr. Arthur G. Rueckert,** Staff Artist, made a survey of eastern museums in connection with projects for the Department of Geology.

CHAMELEONS—

(*Continued from page 4*)

learning period. At their first feeding attempt, the babies were able to project the sticky tongue a full inch and a quarter, a greater distance than their body length, and hit the target accurately. Small spiders, flies and tiny insect larvae form their present diet.

Preparations are being made for more such broods, from several other expectant female chameleons.

Viviparous production of young is well-known in several species of chameleons in temperate South Africa, and is reported for montane species in East Africa, presumably for the very species in question. Most chameleons, however, lay eggs, depositing them in excavations in the soil. Needless to say, the production of tiny replica chameleons adds to the combination of fascinating interest and charm of the first Chicago chameleon colony.

Brief survey tours of the Museum, suited to a visit of one or two hours but possible in thirty minutes for those who have to skim through in a hurry, are outlined, with charts, in the latest Museum General Guide.

AMAZON REGION INDIAN COLLECTION ACQUIRED

By DONALD COLLIER
CURATOR OF SOUTH AMERICAN ETHNOLOGY AND ARCHAEOLOGY

The Indians of the northwest Amazon area, a vast tropical rain forest cut by many rivers, have been less affected by modern civilization than the Indians of any other major area in South America. One of the most isolated parts of the northwest Amazon is the region of the Rio Vaupes, a western tributary of the Rio Négro, in southeastern Colombia. The Vaupes region is inhabited by about 8,500 Indians grouped into some twenty tribes, each speaking a different dialect. Most of the dialects belong to the Tucanoan stock, but a few fall in the Tupi and Arawak stocks. As in other parts of the tropical forest, Lingua Geral, a language based on Tupi-Guarani, serves as a *lingua franca*. Most of the commonly known geographical names in the region are derived from Lingua Geral.

During the last 100 years the only contacts of the Vaupes Indians with the outside world have been through sporadic visits of traders, explorers, missionaries, rubber gatherers, and scientific collectors. A good many of these tribes have been visited briefly by etbnologists but only one has been systematically studied. The first general account of the tribes of the region was published by the naturalist, A. R. Wallace, in 1853. Except close to the few mission stations, very few changes have taken place in the Indian cultures as a result of contact with the Whites, although in recent years the Indians have come to depend on such white trade goods as machetes, fishhooks, and firearms.

WOMEN FARM, MEN HUNT

These Indians live by farming, which is done by the women, and fishing and hunting carried out by the men. The staple crop is bitter manioc, from which is prepared bread, a fermented drink, and farinha, which is a dry flour stored or used in trade. Fish are caught with hook and line, spears, nets, and in traps; shot with barbed arrows; and stupefied with barbasco poison. Spears, blowguns with curaré-poisoned darts, bows and arrows, snares and traps are used in hunting.

The Vaupes Indians live in settlements of 50 to 75 persons. Generally the village is housed in one multi-family dwelling. These palm-thatched houses, called malocas in Lingua Geral, measure as much as 60 x 75 feet and may be 30 feet high. They hold up to twelve families. A maloca lasts from three to five years, and then is abandoned because of soil exhaustion in the near-by fields or because the house falls into disrepair.

Warfare was formerly common, and is still carried on in the remoter districts. The favorite weapon is a heavy wooden club. Dead enemies were, and probably still are, eaten at a dance celebrating a victory.

BRILLIANT FEATHER HEADDRESSES

The Museum is fortunate in having acquired recently from Mr. Paul H. Allen a representative ethnological collection from the Vaupes tribes, particularly the Cubeo and Desano. Mr. Allen, who is a botanist, made the collection during a three-years' stay in the Vaupes region while working on the rubber program during the war. The collection includes weapons, baskets of various types, pottery, toys, musical instruments, personal ornaments, and a great variety of ceremonial paraphernalia, including equipment used by medicine men in ceremonies for curing. Most spectacular are the brilliantly colored headdresses constructed of toucan, macaw, and egret feathers. The headdresses are of two types, one worn by young men and the other by tribal elders. Each headdress is constructed of about a dozen separate parts ingeniously fitted together. When not in use the headdress is stored disassembled in a special feather box or trunk constructed of palm leaves.

AMAZONIAN CEREMONIAL HEADDRESS
Worn by the young men of the Desano tribe. The lower part of the crown consists of a string of anaconda vertebrae.

Mr. Allen was able to furnish a quantity of valuable information concerning the specimens and their use, as well as photographs and color slides illustrating various aspects of Indian life on the Vaupes.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Botany:

From: Dr. Paul C. Mangelsdorf, Cambridge, Mass.—11 ears of corn, Mexico and Guatemala; Dr. William L. Brown, Johnston, Iowa—10 ears of old varieties of corn, United States; J. Francis Macbride, Stanford University, Calif.—87 cryptogams, California; Dr. Chester S. Nielsen, Tallahassee, Fla.—101 specimens of algae, Florida; Lewis E. Long, Bluefields, Nicaragua—herbarium specimens and a large collection of seeds, Nicaragua; Colin C. Sanborn, Chicago—61 herbarium specimens, Arkansas.

Department of Geology:

From: Republic Steel Corp., Massillon, Ohio—a collection of economic geology specimens; Anaconda Copper Mining Company, New York—a collection of economic geology specimens; American Brass Company, Waterbury, Conn.—a collection of economic geology specimens; Reynolds Metals Co., Richmond, Va.—a collection of aluminum samples.

Department of Zoology:

From: Robert R. Kohn, Madison, Wis.—6 lizards; Hobart M. Smith, Urbana, Ill.—a lizard (paratype), Florida; William H. Phelps, Caracas, Venezuela—a bird study skin (*Penelope granti*), Paraguay; Dr. Ross H. Arnett, Jr., Washington, D.C.—3 Oedemerid beetles (paratypes), Florida; Dr. C. A. Reed, Tucson, Ariz.—5 salamanders, Oregon; Maj. H. T. Wright, U. S. Army—14 lizards, Japan; William S. Street, Seattle, Wash.—an Alaska brown bear, Alaska peninsula; J. E. Johnson, Waco, Tex.—32 reptiles and amphibians, Texas; C. B. Perkins, San Diego, Calif.—17 geckos, California; Harry Hoogstraal, Chicago—30 chameleons, Africa; Roger Conant, Philadelphia—20 snakes (1 type and 19 paratypes), Louisiana; Boardman Conover, Chicago—5 bird study skins, Sadiya, N. E. Assam; Dr. Don C. Lowrie, Las Vegas, N.M.—31 bats, New Mexico; Kenneth S. Norris, Los Angeles—6 lizards, California; Chicago Zoological Society, Brookfield, Ill.—3 mammals, a bird, and a turtle.

SUMMER LECTURE TOURS TWICE A DAY

During August, conducted tours of the exhibits, under the guidance of staff lecturers, will be given on a special schedule, as follows:

Mondays: 11 A.M., Stories in Stones (survey of fossils, rocks, minerals, and gems); 2 P.M., General Tour (exhibition halls, all departments).

Tuesdays: 11 A.M., Our Living Plants (survey of all kinds of plants); 2 P.M., General Tour.

Wednesdays: 11 A.M., Animal Tales (general survey of animals); 2 P.M., General Tour.

Thursdays: 11 A.M. and 2 P.M., General Tours.

Fridays: 11 A.M., World Neighbors (general survey of people and places); 2 P.M., General Tour.

There are no tours given on Saturdays and Sundays.

Motion pictures of the Museum, its activities, and the scientific subjects within its scope are being made by the recently established Division of Motion Pictures.

LATE BURIAL MOUND ERA CULTURE ILLUSTRATED

By GEORGE I. QUIMBY
CURATOR OF EXHIBITS, ANTHROPOLOGY

A new exhibit recently installed in the Museum's hall of American archaeology (Hall B) deals with the late Burial Mound period in the southern United States. This period lasted from perhaps A.D. 900 to 1300 or even 1400.

During the late Burial Mound period there seems to have been a climax of Indian civilization. This climax was manifested by evidence of widespread trade and commerce, the construction of large and elaborate burial mounds, and the manufacture of fine tools, weapons, utensils, and ornaments, probably made especially for burial with the dead.

Burial mounds were dome-shaped heaps of earth erected over especially prepared funeral areas and graves. Although burial mounds had appeared earlier in the southern United States, the largest and most elaborate were built during the late Burial Mound period. In Louisiana, for example, a burial mound of the Marksville Indians was 90 feet in diameter, 21 feet high, and contained more than a thousand skeletons. Accompanying the skeletons were tools, weapons, utensils, and ornaments, probably made especially for burial purposes.

In this mound there were many examples of fine pottery with carefully made, incised and stamped designs; plain and effigy platform pipes of fired clay; figurines of clay or stone; beads of copper and galena; copper bracelets; ornaments of coal; and copper ear spools.

Sources of galena, copper, and coal do not occur in Louisiana; therefore the raw materials or the finished products made of these materials must have been imported from elsewhere. Chemical and physical analyses of the copper ornaments showed that the copper came from deposits in northern Michigan. Probably the beads, earspools, and bracelets were actually manufactured in the north, Ohio or Illinois for instance, and reached Louisiana by means of trade. Copper, or objects made of copper, was only one of the many classes of objects traded over the eastern United States during the Burial Mound period. Other raw materials bartered about at this time were galena, coal, obsidian, rare flints, fossil sharks' teeth; Gulf Coast and Florida marine shells, mica, alligator teeth, quartz crystals, and fish jaws.

In addition to the Marksville culture of Louisiana, the following cultural groups are representative of the Burial Mound period in the southern United States: the Copena culture of Alabama, the Crystal River culture of Florida, and the Swift Creek culture of Georgia, to mention only a few.

The new exhibit attempts to capture the essence of the late Burial Mound period rather than to show the details of any one culture belonging to the period. Toward that end, the new exhibit illustrates the type of stone projectile points, pottery, stone knives, stone axes, tobacco pipes, stone ornaments, and shell dippers as well as the mound building activities of some of the Indians of the late Burial Mound period. The new exhibit is the work of Artist Gustaf Dalstrom assisted by the writer.

FISHES OF BERMUDA GIVEN TO MUSEUM

While plans were being laid for the Bermuda Deep Sea Expedition, Mr. Loren P. Woods, Curator of Fishes, suggested a long-range project for renewed study of the Bermuda shore fishes, especially with the idea of making use of such times of rough weather as might prevent deep sea operations by the *Caryn*, expedition ship. Mr. Woods' studies on the Bikini collections at the United States National Museum have convinced him of the necessity for using the new techniques of coral reef collecting, and of the fruitful and sound results obtainable from study of collections so made.

The enthusiastic interest of the Museum party now in Bermuda has led Mr. Louis Mowbray, Jr., Director of the Bermuda Aquarium, to present his father's collection of Bermudian and other fishes to the Museum. The Mowbray collection, made over a period of forty-odd years, is rich in the rare forms that even a scientific fisherman may require luck to get. It thus forms a most desirable nucleus for the renewed collecting by Mr. Woods.

One of the principal activities of Curator Woods, Associate Marion Grey, and Preparator Ronald Lambert during their first weeks in Bermuda has been the packing for transmittal to the Museum of this collection. This large job, together with preliminary shore collecting, was carried on while the Museum group was waiting for the *Caryn*, which had been delayed at Woods Hole for essential refitting. First hauls of dredge and trawl will be made under the direction of Mr. William C. Schroeder, of the Oceanographic Institution at Woods Hole.

NEW MEMBERS

The following persons became Museum Members between June 16 and July 15:

Contributors

Mrs. Charles V. Riley*

Associate Members

Harrison B. Barnard, Master J. Patrick Hieber, Mrs. M. K. MacIntyre.

Sustaining Members

William G. Caples

Annual Members

Maxwell Abbell, John Albert Appleton, E. T. Baroody, Ray F. Basten, John Sprague Bauman, Walter J. Bauman, Earl J. Brady, David S. Brown, Albert R. Brunker, Joseph Z. Burgee, Miss O. M. Clark, Allen G. Corliss, W. DeO. Davis, Jr., DeWitt Emery, Frank J. Foley, Louis L. Ga Mache, Theodore S. Gary, Dr. Edmund M. Glavin, Moulton B. Goff, William Haddow, Harold L. Hoefman, M. J. Keller, E. E. Krogh, Sten J. Lundgren, Miss Blanche Martin, H. T. McAnly, J. O. McClintock, William E. Mell, Fred Nemer, Dr. Fredus N. Peters, M. Hudson Rathburn, John M. Rau, Morris Rauh, Charles M. Rhodes, F. W. Ryder, John Schmidt, Walter S. Shafer, T. A. Smith, J. C. Starbuck, Gustave Treffeisen, Raymond F. Thiel, Ivan L. Willis, Allen B. Wilson, Mrs. Frederick O. Windchy.

* Deceased

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

ANCIENT EGYPTIAN RELIGION. By H. Frankfort. Columbia University Press, New York, 1948. 172 pages. 16 full-page illustrations. Price $3.

The things that to most of us mean ancient Egypt were the physical manifestations of the Egyptian's response to his religion. The great stone monuments still standing in Egypt were temples of worship or homes for the dead; the objects in museum halls of Egyptology were offerings propitiatory to the gods, accoutrements of the dead, or they are the dead themselves.

The Egyptian religion concerns itself with perhaps a hundred gods, all seemingly inextricably mixed in fancy. To think like an ancient Egyptian is an impossibility for us. Yet without an understanding of the beliefs that colored the Egyptian's mind, we are bewildered by the maze of gods and unable to see clearly the culture that was Egypt.

Professor Frankfort, through his special interests and years of study, is well equipped to make his way through the maze and arrive at the basic underlying concepts. Approaching Egyptian beliefs from five different aspects, he interprets for us the apparently conglomerate theological doctrines and arrives at what he considers to be the fundamental Egyptian conviction: that only the changeless is ultimately significant. He believes that this concept of a static universe was the oar that steered Egypt for three thousand years.

Of greatest interest for the average reader is perhaps the chapter devoted to a discussion of divine kingship and the Egyptian state. The entire book is a scholarly contribution to the study of religious philosophies.

RICHARD A. MARTIN, *Curator*

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Chicago Natural History Museum

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Members are requested to inform the Museum promptly of changes of address.

ANNA LOUISE RAYMOND

The Board of Trustees of the Museum deeply regrets the death of a friend and benefactor of this institution, Mrs. Anna Louise Raymond. She died in Chicago on August 1, after a long illness, at the age of 94.

ANNA L. RAYMOND

Mrs. Raymond first became interested in Museum activities in 1925 when she expressed particular interest in work for children that had been started in a very small way two years earlier. In this work she saw opportunities to aid thousands of children in enjoying and understanding the world around them through use of Museum exhibits and materials. With keen foresight of growing needs in this field and appreciation of its usefulness to the children of Chicago and surrounding area, she established an endowment for a Museum division to provide tours and other programs. This endowment was dedicated as a memorial to her husband, James Nelson Raymond, who died in 1919. The division, The James Nelson and Anna Louise Raymond Foundation for Public School and Children's Lectures, is well known to children, teachers, and schools in the Chicago region and for hundreds of miles around. In direct contact by programs, lectures, and films not only in the Museum but also in the schools, the Raymond Foundation contributes to the education of around 200,000 children each year; by indirect contact through radio stories and stories published by the Museum, many additional thousands of children benefit from this service established by Mrs. Raymond.

In earlier years, when her health permitted, Mrs. Raymond was a frequent visitor to the Museum. She followed the progress of the activities, watched the children in the halls, and listened to their comments. She knew which exhibits they liked best. One of the many halls especially enjoyed by the children was The Hall of American Indians (Hall 4). In her honor the Board of Trustees designated this hall The James Nelson and Anna Louise Raymond Hall.

The original endowment for the Raymond Foundation was $500,000; but Mrs. Raymond watched the growth of the division and gave smaller annual contributions totaling almost $100,000. At her death, a large bequest was left to be shared by the Museum and Northwestern University.

Mrs. Raymond will be remembered by thousands of friends as one who has left a living memorial in service to children through the Museum.

MIRIAM WOOD
Chief, Raymond Foundation

THIS MONTH'S COVER

September, the traditional going-back-to-school month, brings a change of scene to the Museum, too. Functioning virtually as an extension of the campus of many universities, colleges, and high schools of Chicago and nearby areas, and practically as an integral part of the Chicago public and parochial educational systems, the autumn brings, in place of the summer's recreation-seeking young people, many groups of serious students like those depicted on the cover. This picture, reproduced by permission of the Chicago Sun-Times, was made by Mr. Al Mosse, a staff photographer of that newspaper.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

THE INSECT GUIDE. By Ralph B. Swain. Doubleday & Co., New York, 1948. 261 pages. 454 illustrations, 330 in color. Price $3.

This book may well be used as an introduction by anyone who manifests a primary interest in the multitudinous insects of our environment. It fills the needs of the young and old who ask such questions as: "What is it?" "Where does it live?" and "What does it do?" To the tyro it will prove to be a good introductory volume to a study of the living world's most prominent and widespread major class. Since experience has shown us that the usual technical, hard-to-use keys of the average scientific book are almost impossible for beginners below the college level, it is pleasurable to find that these keys have been replaced in this volume with 454 illustrations, of which 330 are in full color.

By comparing one's capture with the contained illustrations, a reasonably accurate identification of the family to which an insect belongs may be secured. Approximately one-third of the families of insects found in North America north of Mexico are represented here in pictorial form. These include the ones that the average collector is most likely to encounter.

Descriptive material is included for each order and for each family illustrated, and each group bears a number that corresponds to a numbered illustration. In this way one may readily find information about insects that are apparently similar to his capture and thus gauge the accuracy of his comparison, which, in the absence of highly technical, detailed works, is often only approximate. General, easily recognizable characters are described, and such details as growth and development and biological or economic importance are treated at some length for each family representative considered.

An introductory section answers questions of the "What is an insect?" type and includes relationships of insects with plants, other animals, and man. An illustrated discussion of the structure of these animals is made, and a detailed chapter on collecting, preserving, and studying is added to conclude the volume.

EUGENE RAY

On-the-job training for adult life is extended by the Museum to students of Antioch College, Yellow Springs, Ohio. They alternate periods of study on the college campus and periods of employment at the Museum (as at many other institutions and business organizations) as a regular part of the Antioch educational method.

RED FOXES IN THE CHICAGO AREA—CASE FOR THE DEFENSE

By COLIN CAMPBELL SANBORN
CURATOR OF MAMMALS

WHEN any sparsely populated area is opened to settlement or colonization the newcomers live for a time off the country until supply routes become established and they can buy more of their everyday needs. Hunting and trapping usually continue until most of the game and fur-bearing mammals are either driven out or exterminated. Game laws are enacted, but usually too late.

In general, these are the probable reasons for the return and increase of foxes in the Chicago area in the last few years. In 1912 there was a record of a red fox from Joliet and in 1936 another was recorded from Wilmington. Always fairly common in southern Illinois, the red fox had never in the past been anything but rare near Chicago. Today, however, it has increased to such numbers that a local sportsmen's organization petitioned the Forest Preserve

COOK COUNTY VS. RED FOXES—THE DEFENDANTS

Witnesses for the prosecution at recent Forest Preserve Board hearings included sportsmen who charged the foxes menaced pheasants. The defense included members of the zoology staff of the Museum who contended the foxes' depredations had been exaggerated, and that their right to live was equal to that of the game birds —who would have as good a chance to survive the foxes as they would the shotguns of the hunters. (This photograph is by Tappan Gregory and R. R. Sturgis, and appears in the book, "Eyes in the Night," by the former. It is reproduced here by permission of the publisher, Thomas Y. Crowell Company.)

Later on, generally when the colony has become a large established settlement, perhaps a big city, some progressive citizens arouse sympathy and a feeling of responsibility among their fellows for the local flora and fauna. Forest preserves, game refuges, and parks are established, and these, in connection with private estates, golf clubs, and undeveloped subdivisions, provide the food, protection, and quiet that attract birds and mammals. Even species that had become rare or had been exterminated in the area may then return.

In the case of fur-bearers and predators such as mink, skunk, raccoon, and the foxes, a low bounty or none at all and a low price for fur that does not stimulate trapping are factors in their increase once given some protected habitat.

commissioners for permission to have fox drives in the Forest Preserves as it was believed that the foxes were killing off the introduced English pheasants.

It is undoubtedly true that the foxes are eating some of the pheasants, but exhaustive surveys in many states have shown that the food of the red fox is about 50 per cent rabbits and injurious rodents. In summer, berries and fruits make up a large part of its diet. Foxes also feed upon insects, snakes, lizards, frogs, and carrion. Birds eaten are, on the average, only about 10 per cent of their entire diet, when any extensive study is made.

Any habitat will support only the number of individuals for which there is an adequate food supply. The population over that maximum emigrates to less densely populated areas, falls prey to its enemies, or starves. Foxes naturally feed on the most abundant and easy-to-catch species, be it mouse or bird, and so act as a natural check or balance.

The red fox appears to be more abundant at the present time than the gray fox though no survey has yet been made of the individuals per square mile. A pair usually hunts over an area of not more than four to five square miles and, unless hunted with dogs, stays in that area as long as the food supply is adequate.

CACHE SOME FOOD

When food is plentiful, more prey is killed than may be necessary for the immediate needs. This is lightly cached for later use. Sometimes skunks, opossums, hawks, or crows find it before the fox, as when it is buried in snow and the first thaw exposes it.

The red fox mates in late winter and is monogamous and this season is usually the only time at which foxes are seen together. The period of gestation is 51 days and the young are born in late March or April. A large hollow tree or an enlarged woodchuck hole is used for a den. Dens in the ground generally have more than one exit and may be up to 15 feet long and 3 feet below the surface. The nest consists of a little dried grass. The earth from the den is usually scattered as a protection against discovery.

The four to nine young are blind for a week to ten days after birth and do not leave the den for about a month, which continues as their home for about three months. The dog fox, their father, is kept away from the den for a couple of weeks after their birth by the vixen, their mother. He continues to watch the den however and brings food, which he leaves near-by.

The remarkable flashlight photograph here reproduced shows young red foxes about five weeks old at the entrance to their den. It was taken in May by Mr. Tappan Gregory and Mr. R. R. Sturgis. It has appeared in Mr. Gregory's book *Eyes in the Night* and is here reproduced by courtesy of the publisher, Thomas Y. Crowell Company.

SOME STALK THE HOUND

The cunning of the red fox is proverbial. Most of the stories of his intelligent behavior are true, though in some cases, perhaps, they refer to exceptional individuals. Fox hunting with hounds is an age-old custom and it is certain that for a fox to live ten years it would have to be able to elude the hounds. There are stories that certain foxes have returned to find the hound when he had lost their scent; so with some individuals it seems to have become an exciting game rather than a terrifying persecution.

The English red fox was introduced into the eastern states for hunting between 1650

(Continued on page 4, column 2)

BOTANICAL EXPEDITION TO CENTRAL AMERICA

The Museum's sixth botanical expedition to Central America is scheduled to leave Chicago early in September. It will be conducted by the Curator of the Herbarium, Mr. Paul C. Standley, who has led three previous Museum expeditions to that region.

He will sail from New Orleans and land at Tela or Puerto Cortés, on the north coast of Honduras, proceed to the capital, Tegucigalpa, and to the Escuela Agrícola Panamericana, where he had headquarters during the ten months spent in middle Central America during 1946–47. The object of the expedition is the collection of herbarium specimens for further study of Central American flora.

Most of the months the expedition is in the field will be devoted to work in Honduras and Nicaragua, the least known botanically of the Central American republics. For some unknown reason, few plants ever have been collected in Nicaragua. It is the largest of the republics, and a great deal more collecting is needed. In 1946–47 Mr. Standley discovered there 45 new species of plants in little more than two months of work, 25 of them in one small humid valley in the Department of Jinotega. In richness of flora, the Nicaraguan valleys compare favorably with any part of Central America and greatly excel El Salvador.

The same expedition collected in the mountains and lowlands of Honduras two new genera and 52 new species. Most parts of Honduras never have been visited by a botanist, and much more field work is necessary before the flora is at all well known.

MEXICAN BIRD COLLECTING PROVES TOUGH JOB

The Mexican Zoological Expedition, with Mr. Melvin Traylor, Jr., Associate, Division of Birds, in charge, had its first headquarters camp on the edge of a sugar plantation among low hills covered with virgin forest near Cordoba, Vera Cruz.

"This is a peculiar place, and one of the toughest to hunt that I've seen," Mr. Traylor writes. "It's supposed to be in the tropical zone, only 1,500 feet in elevation, but so far I've seen no ant-birds, one ovenbird, two species of wood-hewer, and few flycatchers. Also, I haven't even heard, much less seen, a parrot; and if they're around you're almost sure to know it. Nevertheless, it's the best-looking jungle for miles around.

"The collecting otherwise is fair. I've gotten 150 birds so far, but sometimes it's tough to find even ten birds in a day. The undergrowth is so thick that you can't see at all except in the coffee plantations, which are fairly clear, and when you shoot birds out of the treetops, which is about the only place to see them, they're difficult to find."

Geology Expedition in East

Dr. Sharat K. Roy, Chief Curator of Geology, will spend approximately five weeks in the field starting early in September. He will make studies of and collect igneous rocks in the eastern states, and he expects to spend a good part of the time in the Adirondack region. The field work will be a continuation of the project he began in 1946. The rock specimens are needed to fill existing gaps in and augment the systematic rock collection of the Department of Geology. Dr. Roy's field studies are confined to basic igneous rocks, as he is especially interested in olivine-rich rocks and rocks having a composition somewhat similar to stony meteorites.

CHICAGO AREA FOXES

(*Continued from page 3*)

and 1750. This fact has led to the speculation that the small eastern red fox spread west as the country was cleared and opened up and is the descendant of introduced English stock. It seems certain that if native foxes had been present, English foxes would not have been introduced. Also, while bones of gray fox have been found in ancient Indian deposits, no remains of the red fox have been found. The red foxes of northern and western North America are undoubtedly native; but the origin of the eastern fox is still in some doubt.

The gray fox was said by Kennicott in 1855 to have been not uncommon formerly in Cook County, but in 1936 there was only one positive record, based on a specimen, from the Chicago area. In the winter of 1946–47 two were trapped in southern Lake County and others have been reported, but its numbers have not reached those of the red fox.

The gray fox is more of a woodland animal than is the red fox. It makes its den in hollow trees or logs and among rocks and boulders. Its food is the same as that of the red fox, consisting of rodents, rabbits, some birds, fish, reptiles, berries, nuts, fruit, insects, and sometimes green corn. Three to five young are born in mid-April and the dog fox stays with the family, watching the den and bringing food, but does not enter it while the kits are very young.

REFUGE IN TREES

The gray fox soon tires when chased by hounds and often takes refuge in a tree. It can climb trees, either "shinning" up them or leaping from branch to branch. From here it may leap to the ground and run on, may stay to defy the dogs, or curl up and hide in a crotch or old crow or hawk nest.

Although an over-abundance of foxes, opossums or any other mammal would have to be controlled, it is gratifying to know that these wild animals can find protection and sanctuary at the door of a big city where they can be studied or glimpses of them enjoyed by those who appreciate nature and the beauty of wild creatures.

'OPERATION SHOREFISH'

By MARGARET J. BAUER

A collateral objective of the Museum's 1948 Bermuda Deep Sea Expedition was to get a representative collection of the Bermuda shorefishes for critical comparison with the related or apparently identical species of the West Indies.

The use of rotenone, a commercial insecticide, offered by far the simplest method of fishing for this purpose. In recent years its use for fishing has been found extremely effective. Rotenone is made from cube or derris root, long used by the natives of South America and of other regions to catch fishes for food. The Navy had used it on a grand scale during the "Crossroads Operations" at Bikini Atoll in the Pacific. It is not poisonous to human beings.

Although other expeditions of this Museum have used the method, no one in the party at the time had had much personal experience with this type of collecting, and the only guide the members had was a set of printed directions. The first venture was undertaken with no little trepidation. With our Borgia's *Compleat Angler* in one hand and snatches from 100 pounds of rotenone in the other, members of the party bravely set out to collect shore fishes.

The collecting proved to be a success from the start. The first trip alone brought in more than 200 fishes, representing approximately 28 species.

The pictures on the opposite page tell the story. ⟶

Geologists Meet at Museum

The Museum was host to the eighth annual convention of the Midwest Federation of Geological Societies, August 21–23. Use of the lecture hall was extended to the organization. A special exhibit of geological material and hand-worked jewelry was staged by the organization in the foyer of the James Simpson Theatre. Mr. Paul G. Dallwig, the Layman Lecturer, participated in the program by giving one of his lecture tours of geological exhibits for the group.

Change in Visiting Hours

On September 7, the day after Labor Day, autumn visiting hours, 9 A.M. to 5 P.M., go into effect at the Museum, continuing until October 31.

Among habitat groups of birds of many parts of the world exhibited in Hall 20 are three showing birds of the Chicago region.

'OPERATION SHOREFISH'—1948 EXPEDITION TO BERMUDA

LANDING PARTY. Once the collecting site has been chosen, a small motor launch transports the collectors and equipment to their base.

BEACHHEAD. View of the bay or cove to be worked. The party has landed with the equipment, and each individual begins the job assigned to him.

CLOSING IN. To keep the fishes from escaping into the open ocean, a long seine is stretched from one end of the bay to the other.

MUDPIES. The fish poison, rotenone in powdered form, is mixed with water to the consistency and color of a chocolate malted milk.

ONE MALTED COMING UP. The poison is poured at likely spots, around coral outcroppings, in tide-pools, and wherever fishes may be hiding.

IN OPERATION. After a few minutes the poison takes effect. The fishes come to the surface, floating on their sides. They are gathered with hand nets.

LANDING A MORAY EEL. This is a dangerous shore animal. It recovers rapidly from the effects of the rotenone and puts up quite a fight.

INTO THE PICKLE. The collector waits until he has several fishes in his net before returning to shore to put them in formalin.

THE CATCH. An ordinary haul. The Bermudian fish fauna has an especial interest because the islands are an outpost of the tropical West Indies.

Photographs by Ronald J. Lambert

BIRDS AS BRIGANDS

By AUSTIN L. RAND
CURATOR OF BIRDS

A BRIGAND, according to my desk dictionary, is one who takes by force what is not his. Brigandage is a term for human behavior, of course, but it finds its parallel in the bird world.

The bald eagle meets the definition most aptly. The eagle is fond of fish and, although it is capable of capturing one itself upon occasion, it is a common practice for the eagle to take a fish from the osprey—a fish

Cartoon by Peggy Collings Brown

that the osprey has just caught from the water. The osprey, with a fresh-caught fish, flies heavily. The watching eagle quickly overtakes the smaller heavily laden bird and forces him to drop his prey. Then the eagle swoops down and usually catches the fish before it can strike the land or water. Rarely does the osprey escape with its food under such an attack. It is recorded that an eagle made several dives at one fish-laden osprey and, when it wasn't successful in making the osprey loose its hold on the fish, the eagle dived under the smaller bird, turned over on its back with talons outstretched, snatched the fish from the grasp of the osprey, and flew away with it, as successful a pirate as ever sailed the seas.

NEMESIS OF VULTURES

Besides taking fresh-caught food from the osprey, the bald eagle has been seen pursuing vultures and making them disgorge their meal of carrion. The eagle, if unsuccessful in catching the disgorged food in the air, may land on the ground and eat the food there. We know, also, that the aerial flights that the eagle uses to frighten the vulture into relinquishing its food are not idle threats, for an eagle has been seen striking and killing a bird that refused to disgorge.

Not only does our American eagle carry out such practices, but related species in other parts of the world behave in similar ways. The New Guinea sea eagle harries the osprey in the area it inhabits, and on the west coast of Africa a sea eagle robs pelicans and cormorants of their prey.

Certain long-winged birds of the tropical seas, such as *Fregata magnificens*, are known popularly as man-o'-war birds or frigate birds, reflecting their well-known character as pirates and tyrannical free booters. The "man-o'-war birds glean a portion of their livelihood from the host of creatures which live at the surface of the ocean," but they also get much of their food by forcing terns, cormorants, boobies, and pelicans to deliver up their catch.

In a tropical bay a school of small fish comes to the surface, perhaps driven by large fish below. From far and near terns gather, darting down to seize the fish that jump into the air. Above them circle the frigate birds ready to dive down and chase and harry a successful tern until it drops its fish and leaves its prey to the freebooter.

BOOBIES ARE VICTIMS

Frigate birds also may sail about where a colony of nesting brown boobies is located, waiting for the birds laden with food to return home. When such a food-laden booby returns, the frigate bird then dashes down at it, buffets it with its wings, and snaps at it with its long hooked bill until the booby finally drops its fish for the man-o'-war bird to enjoy.

The skua, a big dark relative of the gull, is also known as a pirate. Its chief food is fish but it also eats many other foods from the sea. It rarely takes the trouble to fish for itself but watches until some other bird, perhaps a gull or a tern, has been successful in its hunting. Then it gives chase, forcing the unfortunate hunter to relinquish its food. Several of the skua's smaller relatives, the jaegars, have similar unpleasant habits. It is written of the Pomerine jaegar off our New England coast: "They are the notorious pirates and freebooters among sea birds, the highwaymen that persecute their neighbors on the fishing grounds and make them stand and deliver." The jaegar gives chase to the lucky tern that "has caught a fish, following every twist and turn in its hurrying flight as it tries to dodge or escape, close at its heels as if attached by some invisible string. At last in desperation the harassed tern drops its fish and the relentless pursuer seizes it before it can strike the water."

STAFF NOTES

Dr. Sharat K. Roy, Chief Curator of Geology, spent several days in Washington, D.C., and New York, negotiating exchanges of meteorites and studying certain falls of meteorites in connection with publications in preparation.... **Mr. Bryan Patterson**, Curator of Fossil Mammals, and **Dr. Rainer Zangerl**, Curator of Fossil Reptiles, attended the 1948 field conference of the Society of Vertebrate Paleontology held in northeastern Wyoming in August.

COLA NUTS

By LLEWELYN WILLIAMS
ASSOCIATE IN FOREST PRODUCTS

Recently the Department of Botany received from Mr. Stewart J. Walpole, of Park Ridge, Illinois, several cola nuts. They are of singular interest because of the importance this forest product has long had as an article of trade in tropical Africa and, lately, its increasing use in the United States in the preparation of refreshing summer beverages.

The tree producing this nut, also known as Kola, Gurú-kurú, Nangué, etc., belongs to the genus *Cola*, of the Cacao family (Sterculiaceae). There are about 40 species throughout tropical Africa, but the one considered superior to all others is *Cola acuminata* Schott & Endl., a medium-sized tree with a dense crown, its branches, reaching almost to the ground, covered with dark green leaves and yellowish-white flowers. It is native in the deciduous forest of the coastal zone between Sierra Leone and the Congo or Lower Guinea, at altitudes below 1,000 feet, and flourishes in low, humid areas. From its native habitat it is reported to have been introduced by slave ships in the early 18th century to the American continent and is now well established and naturalized in several of the islands in the Antilles, as well as in parts of the mainland of tropical America. It has also become acclimated in some of the islands in the Indian Ocean.

Harvesting.—The tree begins to bear fruit after four or five years, although it does not attain full development until it is ten years old. The mature fruit is a yellowish-brown, warty pod, somewhat egg-shaped and two to four inches long, and is harvested twice a year, in May through June and again in October through November. A few hours after falling from the tree the fruit splits open, exposing the seeds, the so-called cola nuts of commerce. The number of seeds in each pod varies from one to five, but usually is three. These seeds are irregular in size and shape, as well as in the manner in which they are tightly wedged one against the other within the shell. They are surrounded by a cream-colored pulp, of a sweet, agreeable taste. When fresh they vary from white, most highly valued by the natives and known as "King cola," to a pale pink with brown wavy lines. When stored for a long period and allowed to dry, they turn dark brown.

After removing the pulp, the seeds are placed in baskets and covered over with leaves, which are sprinkled frequently with water to keep them moist. After about 30 days they are washed in fresh water, repacked, re-covered with moistened leaves, and are ready to be sent to the market. Upon reaching the market, they are dried further by exposure to the sun and are retailed either whole or ground into powder. The consumption within the country is

great, in addition to large quantities sent by caravans to centers in the north and to ports for export to the United States and Europe.

Uses.—Although the tree is limited in its distribution, its seed has long been known to the natives throughout the vast continent of Africa, not only as an article of trade, as a medium to consummate contracts and sales, and for use in civil and religious ceremonies, but also for the superlative stimulating and medicinal properties attributed to it. To the African Negro, the white seed signifies peace and friendship; the red denotes war or opposition. He believes that the seeds possess properties capable of purifying contaminated water, and the pulp and ground seeds are used to clarify turbid water. It is claimed that on a daily ration of 40 grams of powdered seeds a man is able to climb steep mountains or perform strenuous menial work exposed to the intense tropical sun and to live for long periods on frugal meals without suffering any feeling of hunger or exhaustion. The natives are known to subsist entirely on these seeds in times of scarcity of other food plants.

To what substances can these stimulating and therapeutic properties of the cola nut be ascribed? Chemical analyses of the seeds reveal that the active principles causing these physiological and stimulating properties are similar to those found in coffee, tea, and cocoa—namely, *caffeine*, the alkaloid present in coffee, and *theobromine*, the active principle in cacao beans—or represent other constituents not found among these, such as *kolatine* and *betain*, a non-toxic alkaloid found in beet and other plants.

The present uses of cola nuts in the United States and elsewhere are many. As is well known, cola nuts are used on an increasing scale, in admixture with cocoa and other ingredients, to prepare an extract for refreshing drinks. They are also used in the manufacture of tonic wines and liqueurs, confectionery, and certain medicinal preparations.

Specimens of cola nuts are on exhibition, along with other plant materials used for stimulating beverages, in Case 54 in the Hall of Food Plants (Hall 25).

NEW MEMBERS

The following persons became Museum Members between July 15 and August 14:

Associate Members

Adam Hefner, W. Lynwood Smith

Sustaining Members

Mrs. Helen Horton

Annual Members

Aaron L. Balter, Mrs. Marion Herbert Barker, James E. Burke, Theodore M. Caiazza, Glenn A. Clark, Dr. James Wilson Clark, George J. Cullinan, Charles S. Downs, James J. Fitzpatrick, Clarence E. Fox, Fred M. Friedlob, Edward G. Gantner, S. M. Guthenz, Carroll Rede Harding, R. G. Haynie, Benjamin Keach, Victor R. Kendall, D. H. Kinnett, Wilson O. Koehnlein, Lazarus Krinsley, Harry W. Krotz, Jr., Harley B. Langan, Francis L. Lundy, Mrs. Walter G. Maddock, Michael H. Mannion, George J. McDuffie, Mrs. Howard C. Meadors, Morgan F. Murphy, Christopher D. Norton, Frederick J. Price, M. D. Reber, G. B. Rockafellow, Dr. Edwin S. Sinaiko, Albert H. Singer, Bernard H. Traut, Dr. James M. Wall, Earl J. Witt.

U. S. LEAD AND ZINC SINCE THE WAR

By ROBERT KRISS WYANT
CURATOR OF ECONOMIC GEOLOGY

In spite of the termination of wartime demands there remains an increasing need for many of our natural resources. This is particularly true of lead and zinc. Before World War II the annual production in the United States of lead and zinc was greater than domestic consumption, thus making exportation possible. During the war, however, demands far exceeded the resources available and large importations were necessary.

Although opinion differs widely as to the length of time required for the depletion of any particular resource, it is agreed that many of our lead and zinc ore deposits are nearing exhaustion. In view of this fact, new and enlarged ore bodies must be discovered for future use or we shall be in part dependent upon foreign sources for our postwar needs of lead and zinc.

Man has used lead for a very long time. The Chinese used it for coins as early as 2000 B.C. Metallic zinc was unknown until mediaeval times.

Geologically, lead and zinc deposits are often similar and the minerals are commonly associated with each other. The bulk of the world's supply of these metals is derived from the sulfides, galena (lead sulfide) and sphalerite (zinc sulfide) or their oxidation products. The economic geology section of Hall 36 contains a systematic lead and zinc exhibit.

Modern uses of lead and zinc are very numerous. The principal uses of lead are for storage batteries, cable covering, and pigments. Galvanizing and brass making consume the largest amounts of zinc. There are few economical substitutes for lead and zinc.

The United States produces annually approximately one-third of the total world's supply of lead and zinc. The Tri-State District—Oklahoma, Missouri, and Kansas—leads in production in the United States. Other domestic production is derived from smaller deposits in twenty-one other states and Alaska, but all of these do not produce both lead and zinc. Foreign deposits are located in Australia, Canada, Mexico, India, Burma, Germany, Belgium, and Russia.

Present-day consumption of these metals is high. If the United States is to retain a high degree of freedom from importation of these metals, it is expedient that additional sources of lead and zinc be found by geologic exploration. Also these resources must be developed by the best technical methods, rather than by uneconomical procedures used at times in the past.

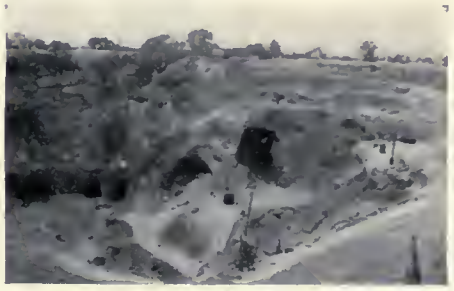
Intelligent geological exploration for lead and zinc should be encouraged. Because the more obvious deposits have been found, every clue must be examined in an effort to locate entirely new deposits. Detailed geologic examination of known deposits with a view to extending present ore bodies and locating new ones is also necessary.

The "tools" of such exploration, in addition to conventional geologic methods include the use of:

A. Geophysical methods;
B. Surface and underground exploration with diamond drills;
C. Geochemical investigation of the occurrence of traces of lead and zinc in outcrops, soils, ground water and in vegetation.

All possible modern technical methods should be used to alleviate future shortages. Such methods are:

A. Improved metallurgical methods including better grinding and improved furnace design and efficient electrolytic refining;
B. Retreatment of tailings and scrap;
C. Use of lower grade ores;
D. Development of substitutes, such as the use of titanium oxide in pigments;
E. Improved mining methods.



MISSOURI LEAD-ZINC MINE

The Oronogo deposit near Webb City. The underground workings of this mine extend several miles.

Examination of present reserves indicates that a partial dependence upon foreign resources soon may be necessary.

Zinc production in Mexico, Canada, Peru, Australia, and Bolivia has been expanded in the last few years. Many factors, such as operating costs, taxes, and political situations, of course affect this production. On account of wartime construction of zinc refineries, the United States is in a favorable position to refine most of the domestic and foreign zinc concentrates required.

NEW CURATOR APPOINTED FOR FOSSIL FISHES

Dr. Robert Howland Denison has joined the staff of the Department of Geology as Curator of Fossil Fishes. Dr. Denison did his undergraduate work at Harvard University and received his Ph.D. from Columbia University. He was Assistant Curator at Dartmouth College Museum from 1937 until his appointment here. Immediately before joining the Museum staff, he spent a year (1947–48) as a member of the University of California African Expedition. Dr. Denison is interested in primitive fishes and has published several papers on the subject. His appointment, in addition to continuing necessary expansion of the staff of the Department of Geology, provides a specialist in a field of paleontology that formerly was not covered.

ROBT. H. DENISON

NEW MUSEUM LIBRARIAN BEGINS DUTIES

Mrs. Meta Pauline Howell has been appointed as Librarian of the Museum, effective September 1. She fills the post left vacant by the resignation of Mr. Carl W. E. Hintz, who has accepted a position as Librarian at the University of Oregon, at Eugene.

META HOWELL

Mr. Hintz has been Museum Librarian since July 1, 1946, and in the little more than two years of his service has made many innovations that have improved the value of the Library to Museum staff and general public alike. He takes with him the best wishes of the Museum staff and Museum administration.

Mrs. Howell has been an assistant librarian at the Museum since March, 1947. Before that she served successively on the staffs of the Buffalo (N.Y.) Public Library and Grosvenor Library in Buffalo; four years at the Chicago Public Library; and for a number of years as assistant librarian at the Museum of Science and Industry, Chicago, and then, from 1940 to 1947, as librarian. For a time she was employed by the *New York Times* to classify and catalogue its library on science and technology.

CARL HINTZ

Also effective September 1, Mrs. Mary W. Baker, who joined the staff in 1930, will retire as Associate Librarian.

ARCHAEOLOGICAL PAYDIRT

BY LEONARD G. JOHNSON
(MEMBER OF THE MUSEUM'S ARCHAEOLOGICAL EXPEDITION TO THE SOUTHWEST, 1948)

The Southwest Archaeological Expedition, under the leadership of Dr. Paul S. Martin, Chief Curator of Anthropology, resumed digging at Turkey Foot Ridge in southwestern New Mexico during the summer of 1948.

By midsummer, three pit-houses had already been excavated, photographed, and surveyed. Two more were nearing completion. Literally by the shovelful, Dr. Martin, his assistants, and a crew of local workers carry on original research to the rhythmic thud of picks and the metallic ring of other tools.

The finds have been particularly fruitful, for Dr. Martin, in conducting his search toward locating the Georgetown and San Francisco phases, is now digging in the pit-houses of Three Circle times, the period directly following the San Francisco period. He is close to his objective, for if he manages to locate the Georgetown and San Francisco phases it will fill a gap of 300 years—from A.D. 600 to 900. Thus, another piece of the chronological jigsaw puzzle would be fitted into place.

The houses that have been excavated appear a little too late on the time horizon. But these excavated houses raise problems of their own.

Why and when was Pit-house C reoccupied, its entrance converted into a ventilator shaft, and niches in the walls stoned up?

Why was the male skeleton in Pit-house D strewn about in a haphazard fashion, a good share of it missing, when there were no rodent holes or any type of evidence to account for its disarticulated condition?

Why in Pit-house E, an unusually large and shallow house, were there a great number of metates (stone tools used for grinding corn, berries, etc.)? Can we postulate a communal corn-grinding house? These are but a few of the questions that arise through field excavation.

The archaeologist will never have all the answers for he will never have all the evidence. But as each house is uncovered, each stone tool measured, and each piece of pottery washed and classified, new information is added to the existing stock and the archaeological picture of the past becomes clearer. The Rosetta stones of archaeology are few and far between. In the meantime the work of the Southwest Archaeological Expedition continues steadily, its members knowing full well that it takes a lot of patient plodding before a significant landmark is reached.

SEPTEMBER LECTURE TOURS, DAILY EXCEPT SUNDAYS

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays; a schedule of these follows:

Wed., Sept. 1—Buried Treasure—Story of Gem Stones (*Winona Cosner*).

Fri., Sept. 3—Animals Without Backbones (*Lorain Farmer*).

Wed., Sept. 8—Dry Region Plants (*Marie Svoboda*).

Fri., Sept. 10—Lake of the Woods—Animals at the Water (*June Buchwald*).

Wed., Sept. 15—Giants in the Animal World (*Lorain Farmer*).

Fri., Sept. 17—Autumn Trails (*Miriam Wood*).

Wed., Sept. 22—Dogs and Men—An Early Partnership (National Dog Week) (*Harriet Smith*).

Fri., Sept. 24—Indian America (Indian Day) (*Harriet Smith*).

Wed., Sept. 29—Plants and Animals Through the Ages (*Jane Sharpe*).

There will be no tour on Saturday, September 4, and Monday, September 6, on account of the Labor Day week-end holiday, but the Museum will be open.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Botany:

From: Colin C. Sanborn, Chicago—61 herbarium specimens, Arkansas; Dr. M. Acosta Solis, Ann Arbor, Mich.—49 microscope slides of sections of Ecuadorian woods and a wood specimen; Tasmanian Forestry Commission, Hobart, Tasmania—a specimen of King William pine, Tasmania.

Department of Geology:

From: R. T. Thompson, Phoenix, Ariz.—a specimen of fluorescent chalcedony.

Department of Zoology:

From: Dr. Nelson G. Hairston, Ann Arbor, Mich.—522 specimens of salamanders, representing 16 species, southern Appalachians; Museum of Comparative Zoology, Cambridge, Mass.—11 beetles, including 2 paratypes, Australia; Museo de Historia Natural "Javier Prado," Lima, Peru—9 rodents, Peru; Sgt. Aloysius V. Lyons and Patrolmen Edward Ohlen and William McNulty, Chicago—1 specimen of American bittern, South Chicago, Ill.; Boardman Conover, Chicago—443 bird study skins and 19 mammals, Mexico and Paraguay.

Library:

From Rafael Larco Hoyle, Trujillo, Peru; Dr. Carlos Monge, Baltimore, Md.; H. Schuser, London, England; Col. Clifford C. Gregg, Valparaiso, Ind.; and Dr. Henry Field, Washington, D.C.

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Cruising for Science—the 'Caryn'

Bermuda Deep-Sea Expedition

Chicago Natural History Museum

FOUNDED BY MARSHALL FIELD, 1893

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Members are requested to inform the Museum promptly of changes of address.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

MAN AND HIS WORKS, The Science of Cultural Anthropology. By Melville J. Herskovits. Alfred A. Knopf, New York, 1948. 678 pages, 66 text figures, 18 plates. Price $6.75 (text edition, $5).

Ethnologists, archaeologists, and other kinds of anthropologists are always talking about culture. This is a perfectly natural state of affairs because culture is the central core of the vast subject of anthropology. However, the concept of culture is difficult to define in a way that makes sense to the beginning student and educated layman interested in anthropology.

For such people, the new book entitled *Man and His Works* by Professor Melville Herskovits provides more than 600 pages of information about the anthropologists' concept of culture. A short and useful definition according to Dr. Herskovits is: "Culture is the man-made part of the environment." Thus buildings, tools, gardens, assembly lines, legal systems, religious beliefs, customs, art, morals, and the like are part of the man-made environment that is called culture. In fact, almost all of human behavior is encompassed by the term "culture."

After a suitable introduction to orient the reader, Dr. Herskovits discusses the nature of culture, the materials of culture, the structure of culture, the aspects of culture, cultural dynamics, and cultural variations. In his final, summary chapter, Dr. Herskovits develops a theory of culture composed of the following propositions: 1. Culture is learned. 2. Culture derives from the biological, environmental, psychological, and historical components of human existence. 3. Culture is structured. 4. Culture is divided into aspects. 5. Culture is dynamic. 6. Culture is variable. 7. Culture exhibits regularities that permit its analysis by the methods of science. 8. Culture is the instrument whereby the individual adjusts to his total setting and gains the means for creative expression.

Dr. Herskovits' new book will be of interest to all students of anthropology and to all laymen seriously interested in anthropology. This book is adequately and pleasingly illustrated.

GEORGE I. QUIMBY
Curator of Exhibits, Anthropology

Museum Great Books Exhibit

The Library of the Museum is participating in the Great Books Week celebration, sponsored by the Great Books Foundation, with an exhibit in Stanley Field Hall. This exhibit, entitled "Great Books of Natural History," began on September 24 and will continue until October 4, inclusive. It includes selected outstanding scientific works from the shelves of the Museum Library, among them rare, old, and historic volumes. Among other institutions participating in the Great Books activities with similar exhibits are the Art Institute of Chicago, Chicago Historical Society, Museum of Science and Industry, University of Chicago, Chicago Public Library, John Crerar Library, and Newberry Library.

Technical Publication Issued

Zoological Series, Vol. XIII, Part I, No. 2. *Catalogue of Birds of the Americas.* By Charles E. Hellmayr and Boardman Conover. August 18, 1948. 434 pages.

Gulf Coast Botanical Expedition

Sometime during the first half of October a botanical expedition will leave for exploration along the Gulf of Mexico from Louisiana to Florida. General collections of algae, mosses, lichens, and fungi will be made, especially those growing in marine and brackish waters. Dr. Francis Drouet, Curator of Cryptogamic Botany, is leader of the expedition. He will return to the Museum in January.

THIS MONTH'S COVER

The "Caryn" at sea. This photograph was taken aboard a small boat, bouncing in the choppy waters ahead of the mother ship, by Mr. Ronald J. Lambert, of the Museum's taxidermy staff, who was a member of the Bermuda Deep-Sea Expedition. The yacht, a 98-foot ketch especially equipped for scientific work, was assigned to joint operation by Chicago Natural History Museum and the Bermuda Biological Station for Research, Inc., from the Oceanographic Institution of Woods Hole, Massachusetts.

OCTOBER LECTURE TOURS, DAILY EXCEPT SUNDAYS

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays (the Friday tours open with an introductory lecture and slides or films in the Meeting Room on the second floor of the Museum); a schedule of these follows:

Fri., Oct. 1—Adapt or Become Extinct! Illustrated introduction in Meeting Room (*Jane Sharpe*).

Wed., Oct. 6—Smoke Tales—Unusual Uses of Fire (Fire Prevention Week) (*June Buchwald*).

Fri., Oct. 8—Migratory Birds. Illustrated introduction in Meeting Room (*Miriam Wood*).

Wed., Oct. 13—Animals of the Seashore (*Lorain Farmer*).

Fri., Oct. 15—Nature's Sweet Tooth—Story of Sugars. Illustrated introduction in Meeting Room (*Marie Svoboda*).

Wed., Oct. 20—Animals of the Six Continents (*Jane Sharpe*).

Fri., Oct. 22—The Story of Writing. Illustrated introduction in Meeting Room (*Harriet Smith*).

Wed., Oct. 27—Plants with Romantic Stories—Strange Stories Behind Some Well-known Plants (*Marie Svoboda*).

Fri., Oct. 29—Masks—Not for Halloween. Illustrated introduction in Meeting Room (*June Buchwald*).

One of the most unusual exhibits in the Department of Botany is the habitat group of Welwitschia showing this remarkable plant amid a reproduction of its natural environment, a scene in a west African desert. The exhibit is in Martin A. and Carrie Ryerson Hall (Plant Life—Hall 29).

DEEP-SEA TRAWLING OFF BERMUDA ISLES ON THE 'CARYN'

By LOREN P. WOODS AND MARION GREY

(This is the story of the deep-sea operations of the Bermuda Deep-Sea Expedition, 1948, conducted jointly by the Museum and the Bermuda Biological Station for Research, Inc.—the shorefish collecting operations were the subject of an article in the September BULLETIN. The writers, Mr. Woods, Curator of Fishes, and Mrs. Grey, Associate in Fishes on the Museum staff, were both members of the expedition. The photographs are by Assistant Taxidermist Ronald J. Lambert. The expedition, largest sponsored by the Museum in recent years, was under the leadership of Dr. Fritz Haas, Curator of Lower Invertebrates. It has now completed its work in the field, and the long tasks of sorting and identifying study specimens, research, and preparation of exhibits are beginning. This article winds up those on collecting operations, but further articles on the results of the work will appear in future issues.)

THE auxiliary ketch-yacht *Caryn*, used during the summer of 1948 by the Museum's Bermuda Deep-Sea Expedition, has been found to be admirably suited for deep-sea fishing because of its size (98 feet) and easily managed fore-and-aft rig. In ordinary seas towing can be carried on at a speed of about four or five knots. Owing to the ease with which the ship may be handled, few men are required to handle the gear.

The most essential piece of equipment used in deep-sea exploration is a large sturdy winch. The one on the *Caryn*, located amidships, carries slightly more than 12,000 feet of 3/8-inch steel cable, which is led over a series of three heavy, specially constructed pullies, arranged to relieve the strain both on net and winch. The nets used were 7- and 12-foot ring nets and 35- and 65-foot otter trawls, all small nets compared to those used in commercial fishing operations. Into the end of each of these nets had been sewn a soft cone-shaped cloth supported by rings and capped at the apex with a straight-sided can. This modification of the nets has resulted in bringing soft-bodied fragile fishes and invertebrates to the surface in cold sea-water, protected from the mashing and rubbing effects of the net.

PRIMARY OCEANOGRAPHIC TOOL

On most ships the winch would be used chiefly for straining on hawsers or weighing the anchor, but on the "Caryn" its principal purpose is to haul in the trawls with specimens of deep-sea life desired for the expedition's scientific purposes.

TRAWLING NEAR ABYSS

During the first month of operations the work was exploratory, with fishing in scattered localities off the southern and western parts of Bermuda. Less than ten miles off the southern shore the bottom dips to more than 1,000 fathoms (a depth of more than a mile) and it is in this near-by deep area that most of the previous deep-sea fishing around Bermuda has been carried on. Less than twenty-five miles to the southwest of the islands are two extensive banks, lying only twenty-three to twenty-six fathoms below the surface, surveyed seventy-five years ago by the famous Challenger Expedition. These banks have precipitous slopes dropping off to abyssal depths. The outlying position of these banks, combined with complicated currents surrounding them, makes them fishing grounds likely to be of considerable interest. Trawling by the *Caryn* was about equally divided between these two general areas and was carried on well above bottom between the depths of 250 and 800 fathoms.

The usual procedure was to leave St. George's Harbor in the afternoon, arriving in the area to be fished just before dark, thus allowing time for two or three hauls during the night. Night fishing in deep water is more productive than daylight work owing to the migration towards the surface of many kinds of animals during the dark hours. When the ship arrived over sufficiently deep water, we chose a course over which the net was to be hauled, giving due consideration to the bottom contour, the currents, so far as known, and the wind.

After the net has been carefully inspected at its attachment to the cable and the end where the fishes gather has been tightly tied, it is thrown overboard and subsequently dragged in a large circle until free from twists. At a signal from the captain, the winchman slowly pays out a few fathoms of cable and when the net is seen to be clear and in proper fishing position it is slowly lowered away. One to two hours are involved in lowering the net and it is hauled at its maximum depth for about the same length of time, while the ship labors and wallows with the increasing strain and pull of such a cumbersome sea-anchor. At least

TWELVE-FOOT RING NET GOING DOWN

Each time the net was hauled up, the scientific personnel aboard the "Caryn" had the prospect of surprises in the way of possible species hitherto unknown to science or at least of types of abyssal marine animals very much needed for the Museum's collections.

BERMUDA BIOLOGICAL STATION

This research institution at St. George's in the islands was joint sponsor with the Museum of the Bermuda Deep-Sea Expedition. Its laboratories and other facilities were of utmost usefulness to members of the Museum party.

another two hours are required to raise the gear back to the surface. Two or three hauls were usually made.

QUICK-FREEZE FOR SPECIMENS

The end of the net in which the specimens collect must be kept suspended upright and carefully untied so that neither the water nor its contents are spilled, an accomplishment sometimes presenting the handlers with considerable difficulty on the rolling, tossing deck. When the can is removed from the net it is held down in a large enamel tray while the catch is briefly inspected. Living material is placed in iced sea-water to be examined while the next haul is being made, at which time luminous organs are examined and colors noted. Certain fishes and invertebrates are selected for bacterial studies, luminous bacteria being collected by scraping the skin and squeezing out the contents of the intestines into nutrient solution. These bacteria are being investigated by E. R. and Martha Baylor, of Princeton University and Rockefeller Institute. When the rest of the material has been preserved or otherwise cared for, the animals left in the soft bag in the net are washed into a pail and placed in preservative. The net is then searched from end to end by all hands for any animals that may have become tangled in its meshes.

Back in the laboratory the living animals, chiefly prawns, which have been kept at a temperature of about 40 degrees, are returned to the refrigerator to be used in physiological and morphological studies by Dr. Ralph Dennell of Manchester, England. Dr. Dennell, who has previously been working on luminescence in insects, has come to the Bermuda Biological Station to study the luminescence of deep-sea crustaceans. Light production in many deep-sea animals is accomplished through association with luminescent bacteria. Thus there has developed a symbiotic "mutual benefit" association of animal host with luminous guest bacteria that affords biological problems of intriguing interest.

Dr. Lyell J. Thomas, of the University of Illinois, engaged in examination of specimens for parasites, both external and internal and co-operated in the work of the Museum party. His field of interest promises to be especially fruitful of novel results.

A DEEP-SEA DENIZEN

The luminous stalk-eyed squid from great depths. Most of its tentacles are greatly reduced in length compared to those of its relatives inhabiting the waters nearer the surface. It is about 3 inches long.

SORTING AND TAGGING

Preserved specimens are poured into flat-bottomed bowls and trays, and the invertebrate animals are sorted out by Dr. Fritz Haas, leader of the expedition and Curator of Lower Invertebrates at the Museum, for special treatment and study. Specimens both of these and of fishes are set aside for photographing by Mr. Ronald J. Lambert, taxidermist, who will later take part in providing models for the projected new Hall of Deep-Sea Life.

The collections are further sorted, tentative identifications made, and more detailed notes taken before the specimens are bottled up in containers of appropriate size for hardening in alcohol or formalin. Later they are loosely packed in cotton-stoppered vials, wrapped in cheesecloth, some braced with light strips of wood, and are stored in large containers until time to ship them to Chicago Natural History Museum for detailed study and description.

The results of the collecting have been gratifying, particularly in regard to variety of species and the excellent condition of the specimens obtained. Each net haul brought up species not previously caught by us, and nearly all are new additions to the Museum's study collection, which until now has contained very few deep-sea animals.

MOSTLY TINY CREATURES

The outstanding difference between an ordinary catch of fish and a haul brought up from deep water is in the individual size of the specimens. Deep-sea nets capture mostly tiny, slow-moving, or young fishes and any specimen over 6 inches long may be considered "large." Nevertheless the *Caryn* collection contains a number of fishes 9 or 10 inches to 3 feet long, including several gulpers (*Eurypharynx*), deep-sea snake mackerels (*Thyrsitops*), a fish named *Echiostoma*, which is equipped with a variety of luminous organs, and several kinds of eels.

Color is another striking characteristic of a haul of deep-sea fishes, particularly when contrasted to a catch of reef fishes such as those found in the waters of Bermuda. Instead of the array of bright color patterns, specimens from the depths display an all-over black, drab gray, or silver hue; or they

FISH THAT LIGHTS ITS WAY

The spiny-mouth, Echiostoma, has luminous fins, a luminous cheek light, luminous teeth, and two rows of luminous organs on the body. It ranges up to a length of 12 inches.

A STRANGE CREATURE IS THE GULPER

Its scientific name is Eurypharynx, Greek for wide-throat. Another good descriptive name is pelican fish. It grows to lengths of about 2 feet.

are transparent or translucent white, the latter color usually found in larval and young forms. Bizarre form and luminous organs are characteristic of deep-sea animals, whether fishes, crustaceans, or squids.

Among the invertebrate animals brought up by the trawl, crustaceans predominate; and these creatures are as unlike their shallow-water relatives as are the deep-sea fishes. Deep-sea squids are especially remarkable, a notable example being the luminescent form with eyes at the ends of retractile stalks and with greatly modified tentacles, shown in one of the accompanying illustrations.

The work of the Bermuda Deep-Sea Expedition, 1948, has been assisted and expedited by Dr. Dugald E. S. Brown, Director of the Bermuda Biological Station, who has long been interested in the physiology of deep-sea animals. Acting in an advisory capacity, Dr. Brown has helped with the planning of each cruise, supplied miscellaneous equipment to increase the scope of the collecting, and contributed much information about deep-sea fishing in general and oceanographic conditions around Bermuda in particular. Mr. Noel Burland, of Bermuda, rendered invaluable assistance in all of the operations of the *Caryn*. Mr. Howard Taylor, of New York, an undergraduate student at Yale, worked faithfully as a volunteer and later joined the crew of the *Caryn*.

SATURDAY MORNING CHILDREN'S MOVIES

The James Nelson and Anna Louise Raymond Foundation will present its autumn series of free motion-picture programs for children on Saturday mornings, beginning October 2 and continuing through November 27. All of these programs will be given at 10:30 A.M. in the James Simpson Theatre of the Museum. In addition to motion pictures, lecturers will appear on five of the nine programs.

Children may come alone, accompanied by adults, or in groups from schools, etc. No tickets are needed.

Following is an outline of the programs:

October 2—MIDNIGHT MOVIES IN ANIMALAND
Lecture by Howard Cleaves

October 9—RUGGED ROAD TO CAPE HORN
Auto adventuring down South America
Also a cartoon

October 16—STRANGE NEIGHBORS
Lecture by William G. Hassler, Nashville Children's Museum

October 23—FUN WITH FRIENDS OF FUR AND FEATHER
Lecture by Cleveland P. Grant

October 30—THE FOUR SEASONS
Also a cartoon

November 6—THE PEIPING FAMILY
A middle-class family in China
Also a cartoon

November 13—BACKYARD ADVENTURE
Lecture by Allan Cruickshank, National Audubon Society

November 20—JERRY PULLS THE STRINGS
The story of coffee told by puppets in a color motion picture

November 27—BACKYARD SAFARI
Animals close to your home
Lecture by Murl Deusing, Milwaukee Public Museum

Growing year by year, the Museum Library now contains approximately 128,000 volumes, all covering phases of the sciences within the scope of the Museum. It is the largest library in its specialized field west of the Alleghenies.

STEWARTIA—SHE'S 'MISS AMERICA' OF THE SHRUBS

BY JULIAN A. STEYERMARK
ASSOCIATE CURATOR OF THE HERBARIUM

MOST people appreciate and love beautiful objects in nature, but frequently don't know where to find them. Sometimes they gain the impression that they must travel to distant lands or to inaccessible mountain tops in the hope of locating unusual plants and animals. They will, therefore, be pleasantly surprised to learn that some of the most beautiful plants can be found in the United States, and only about 650 miles by auto roads from the heart of Chicago.

In this instance, I refer to a shrub, native in the southern Appalachian Mountains. Although its relatives, camellia and tea, are well known, camellia for its prominence as an ornamental plant, and tea for the drink prepared from its leaves, the shrub of the southern Appalachians is relatively little known. Like most of the members of the tea family (*Theaceae*), it has large showy flowers. This beautiful shrub, called mountain Stewartia (also spelled Stuartia) or mountain camellia, its scientific name being *Stewartia pentagyna*, easily ranks as one of the showiest and most attractive of native shrubs in the United States.

Growing to a height of nearly 15 feet, this shrub is covered during the months of June to August with large blossoms about 3 inches across. The five to six spreading cream-colored or white petals have a lavender or pinkish tinge on the outside and surround a central mass of numerous purple stamens. From a distance they resemble a large white rose or even a flowering dogwood. Unlike the dogwood, however, the flowers appear when the leaves are fully developed.

By keeping a close watch along some of the roads in the Great Smoky Mountain National Park at elevations between 1,000 and 1,500 feet, or at similar elevations in parts of the Blue Ridge and Piedmont Plateau, travelers are likely to find this beautiful shrub in the forests, generally near streams and in rich woods. A closely related species, known as silky camellia or Virginia Stewartia (*Stewartia Malachodendron*), grows at lower elevations near and in the coastal plain from Virginia southward and westward. Four other species are known from eastern Asia, principally Japan. The latter country, incidentally, is the home of some species of the true camellia, although that genus is represented in other parts of the Orient and some of the Philippine and Celebes Islands.

It is most fitting that a great patron of botany, John Stuart, the Marquis of Bute, should be commemorated by such a striking plant. When people rave about the camellia gardens of the southern states, they should remember that camellias were introduced into horticulture from the Old World and that they actually have a rival, belonging to the same family, but less known, in the mountain camellia or Stewartia, a plant native in the United States.

Photo by Cora Steyermark

'MOUNTAIN CAMELLIA'

Otherwise known as Stewartia pentagyna. Picture shows a branch with flower. The petals are creamy white and surround a mass of purple filaments.

Four paintings of modern whaling methods and a large mural of whaling in the days of "Moby Dick" are features in the Hall of Whales (Hall N–1).

EXHIBIT OF PRE-INCA CULTURES OF PERU

By DONALD COLLIER
CURATOR OF SOUTH AMERICAN ETHNOLOGY AND ARCHAEOLOGY

A recently installed exhibit in the Hall of American Archaeology (Hall B) deals with the pre-Inca cultures of Peru. This exhibit completes an alcove on Peruvian archaeology that includes an exhibit on the Incas and a diorama showing daily life in an Inca village about A.D. 1450.

Peru was one of the two great pre-Columbian culture centers in the New World. Only in Peru and in Middle America did Indian culture attain that level of development and complexity that historians call civilization. The greatest achievements of the ancient Peruvians were in technology, political organization, and social planning. In contrast, the Mayas excelled in abstract thought (mathematics, astronomy, philosophy), art, and architecture.

PRE-INCA WEAVING

Detail of new Peruvian archaeology screen in Hall B. The panel displays specimens of the art and the tools used in it.

One of the most important and absorbing problems in American archaeology is the tracing of the Indian civilizations in Middle and South America back to their earliest beginnings. As yet this search in Middle America has carried us back only a little more than 2,000 years to the archaic farming and pottery-making cultures that were the forerunners of the high cultures of Mexico and the Maya area, and were on about the same level of complexity as the prehistoric Pueblo culture of Arizona and New Mexico.

BEGINNINGS OF AGRICULTURE

But on the coast of Peru it is now possible to carry history back 3,000 years or more to a simple fishing culture with the beginnings of farming and weaving but no pottery or metal. Farming may turn out to be older in Peru than in Middle America, since present botanical evidence suggests that the two basic New World crops, corn and manioc, were first cultivated in South America. Pottery was first made on the coast of Peru about 500 B.C., or possibly earlier, at the beginning of the cultural period called by archaeologists Chavin or Cupisnique. From this point on it is possible to follow in considerable detail the evolution of Peruvian culture through the development of a highly efficient irrigation agriculture utilizing more than forty species of cultivated plants, the perfection of pottery-making, weaving and metallurgy, and the creation of complex political structures that culminated in the formation of the Inca empire.

One of the outstanding achievements of the Peruvians was in weaving. Their textiles of cotton and wool, which included tapestries, brocades, embroideries, gauzes, and lace, were the finest in the New World. For this reason, the central panel in the new exhibit is devoted to displaying specimens of this art and tools used in it. Examples of the following weaving techniques are shown: plain weave, tapestry, plaiting, double-face twine plaiting, under-float warp, and needle-knitting. Ajoining this panel is an enlarged reproduction of a weaving scene taken from a painted vase of the Mochica period (about A.D. 900).

CERAMIC STYLE SEQUENCE

A panel at one end of the exhibit illustrates by means of typical examples of pottery the sequence of ceramic styles on the north coast of Peru over a span of 2,000 years from the Cupisnique period to the Incas. This ceramic sequence is longer and better known than that of any other region in Peru. The perfection and better understanding of this sequence was the chief objective of the Museum's 1946 Archaeological Expedition to Peru (see "Peruvian Archaeological Expedition Returns; 1,500 Years of History Uncovered," BULLETIN, February, 1947). It is of interest to note that knowledge gained on that expedition made it possible to identify in the Museum's collections the Cupisnique pottery vessel displayed at the bottom of the sequence panel. This pot had been incorrectly restored by the Argentine collector who sold it to the Museum, and it had lain unrecognized in the storeroom for thirty-five years. It is one of the few examples of this type in the United States.

In the remainder of the exhibit are shown weapons, utensils, musical instruments, and ornaments.

The new exhibit was designed by Gustaf Dalstrom, Artist in the Department of Anthropology, and the writer.

Fourth Nature Photography Exhibit Scheduled

Plans are under way for the Fourth Chicago International Nature Photography Exhibition to be held at the Museum under the sponsorship of the Nature Camera Club of Chicago. The deadline for entries will be January 17. The exhibition will be held from February 1 to 28, inclusive, with two screenings of colored slides to be presented on February 13 and 20.

Rules and arrangements will be approximately the same as those for the last exhibit (as outlined in the December, 1947, BULLETIN), Mr. H. J. Johnson, chairman, announces. Entry forms and details of the rules may be obtained by application to Mr. Johnson, whose address is 1614 West Adams Street, Chicago 12. Further information on this contest and exhibition will be published in later BULLETINS.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: Museum of Anthropology, University of California, Berkeley, Calif.—10 pottery sherds, Fiji Islands.

Department of Botany:

From: Dr. Cesar Vargas C., Cuzco, Peru—50 herbarium specimens, Peru; Museo Nacional, San José, Costa Rica—350 herbarium specimens, Costa Rica; Brother Léon, Havana, Cuba—30 herbarium specimens, Cuba.

Department of Geology:

From: Robert M. Hawk, Denver—5 fragments of nephrite, Colorado; Roy O. Plummer, San Diego, Calif.—a slab of Pliocene fossils and a concretion with snail shell, California.

Department of Zoology:

From: Juan A. Rivero, Mayaguez, Puerto Rico—16 frogs, Puerto Rico; Walter L. Necker, Chicago—2 lizards, Switzerland and Italy; Roger Conant, Philadelphia—9 snakes and 2 frogs, Del-Mar-Va Peninsula; Jay Thomas, Ogden Dunes, Ind.; and T. W. Pape, Jr., Chesterton, Ind.—a left mandible of Canada porcupine, Indiana; Chicago Zoological Society, Brookfield, Ill.—an adult bactrian camel and a gibbon; Charles F. Hilder, Pacific Grove, Calif.—4 snake skins, East Africa and Brazil.

Library:

From: Luis E. Pena Guzman, Santiago, Chile; Dr. C. Kim, Seoul, Korea; George Langford, Mrs. Winona Cosner, and Paul C. Standley, all of Chicago; and Mrs. Charles V. Riley, Washington, D.C. (posthumous gift).

EXPEDITION DISCOVERS 'MISSING' INDIANS

By PAUL S. MARTIN
CHIEF CURATOR, DEPARTMENT OF ANTHROPOLOGY

From western New Mexico we bring important archaeological news—four centuries of missing Indian history has been restored by the excavations of the Museum's 1948 Archaeological Expedition to the Southwest.

For some years the writer, as leader of the expedition, has been investigating the little-known culture of the Mogollon Indians in Pine Lawn Valley near Reserve, New Mexico. In past summers I discovered that the founders of the Mogollon culture settled in Pine Lawn Valley 6,000 years ago.

A LONG BLANK PERIOD

As I laid in supplies early this summer for the 1948 expedition into the rough, mountainous country of southwestern New Mexico I held some doubts as to the success we would have in reaching our objective. The time period from A.D. 500 to 900—about from the fall of Rome to the beginning of the Middle Ages, a period as important to the history of the New World as it was to the Old World—was a complete blank for this area in New Mexico.

True enough, we had been successful in tracing the Mogollon Indians from the roving, hunting bands of 6,000 years ago to the pit-house (a cellar with a roof) villages of A.D. 500. What had become of these Indians since A.D. 500? The Mogollones had successfully hidden all traces of themselves until the Museum expedition entered the field in the summer of 1948.

The thrills of archaeology are few and far between, but this summer, following up a few slender clues, the expedition struck "paydirt."

Little by little as first one and then another pit-house was uncovered and the pottery analyzed statistically, it became apparent that one of the goals of the expedition had been achieved.

We hesitated to announce this discovery until we were certain that our interpretation of the work was correct.

THE GAP FILLED IN

Now without doubt a "lost" period has been discovered—the tremendous gap in time from A.D. 500 to 900 has been filled.

The analysis of the results of the discoveries of the expedition have not proceeded far enough yet to warrant saying too much at this time, but a few facts can be released now. The pit-houses of the now partially filled time-gap, called in archaeological jargon "Georgetown" and "San Francisco" phases, are very different from others found in this area. They tend to be deep and rectangular with long, stepped passage-entryways facing the east. Foodstuffs are no longer stored in pits dug into the floor; now fashion dictates cupboards more conveniently placed in the walls. The long history of plain, undecorated, ugly brown pottery was broken and for the first time in Mogollon Indian history delicate and well-executed decorated pottery appears. The designs consist of rectangular elements set forth with restraint in red on a pleasing, warm, brown background.

From a preliminary survey of the civilization of the period it is possible to state that it shows distinct advances over previously discovered ones in this area. And of greater interest is that it spans the time between a period of just crude, plain living to the beginnings of a groping civilization.

STAFF NOTES

The Museum will be represented at the Midwest Museums Conference at Minneapolis this month by **Colonel Clifford C. Gregg**, Director, who will deliver an address on "The Museum and its Relation to the Community." . . . **Mr. John R. Millar**, Deputy Director, attended the education symposium and other sections of the meetings of the American Association for the Advancement of Science in Washington, D.C., last month. . . . Following her official retirement September 1, **Mrs. Mary W. Baker** has been retained on the staff of the Library to give her attention to the important work of reclassification. . . . **Mr. Clifford H. Pope**, Curator of Amphibians and Reptiles, has returned to the Museum after two months at the Mountain Lake (Virginia) Summer Biological Station, where he continued his studies of several years on salamanders of the Southeast. . . . **Dr. Earl E. Sherff**, Research Associate, Systematic Botany, **Dr. José Cuatrecasas**, Curator of Colombian Botany, and **Dr. Theodor Just**, Chief Curator of Botany, attended the meetings of the Botanical Society of America in Washington, D.C., in September. . . . **Dr. Paul S. Martin**, Chief Curator of Anthropology, **Mr. Donald Collier**, Curator of South American Ethnology and Archaeology, and **Dr. John B. Rinaldo**, Assistant in Archaeology, attended the recent Southwestern Archaeological Conference at the University of Arizona Archaeological Field School, Point of Pines, Arizona. Dr. Martin presided at a session on the Mogollon culture of the Southwest. . . . **Dr. Alexander Spoehr**, Curator of Oceanic Ethnology, has returned from Harvard University, where he taught social anthropology during the summer. He was recently appointed review editor of the *American Anthropologist*. . . . The Chicago Historical Society has featured an exhibition of paintings, "In Lincoln Park," by **Mr. Gustaf Dalstrom**, Artist in Anthropology, and his wife, Frances Foy. . . . **Mrs. Winona Cosner**, guide-lecturer, has resigned from the Raymond Foundation to live in Charleston, West Virginia.

SPECIAL NOTICE

Members who have changed their residence, or are planning to do so, are urged to notify the Museum of their new addresses, so that copies of the BULLETIN and all other communications may reach them promptly.

Collects Fossil Invertebrates

Several hundred specimens of fossil invertebrates have been added to the Museum's collections as the result of the recent field trip by Mr. Eugene S. Richardson, Jr., Curator of Fossil Invertebrates. He visited several well-known localities in the Paleozoic rocks of Pennsylvania, from which the Museum's representation had been inadequate. Among the fossils sent back to Chicago, probably the most important are some well-preserved ostracodes, tiny marine crustaceans related to crabs but with a two-valved shell like the clams. Also included are shells and clay to be used in a reconstruction of a part of one of the famous cliffs of the shore of Chesapeake Bay, where certain beds are composed almost entirely of Miocene mollusk shells.

Visiting Scientists

Dr. Misael Acostá Solis, Director, Museum of Natural Sciences, Quito, Ecuador, is spending six weeks at the Museum, in the Department of Botany, pursuing his studies on tropical timbers, in preparation for his book, *Woods of Ecuador*.

Dr. Walter Kiener, biologist of the Game, Forestation and Parks Commission, Lincoln, Nebraska, spent September in the Museum, working in the cryptogamic herbarium.

NEW MEMBERS

The following persons became Museum Members between August 16 and September 13:

Annual Members

H. D. Arneson, Mrs. Emil Borman, John M. Budd, Charles S. Cadwell, Phillip R. Crippen, Jr., Mrs. Robert F. Dick, Newcomb W. Diehl, R. W. Fitzgerald, Mrs. Lee Frank, Mrs. Neneen R. Frothingham, Harry Kaye, Mitchell Kilanowski, Wilfred J. King, Eugene C. Lang, Dr. Clayton J. Lundy, C. E. McCollum, C. E. McKittrick, Keith B. McKy, Mrs. James W. Merricks, Mrs. George Michels, Harry J. Owens, Howard I. Potter, L. M. Rasmussen, Hugh J. Reichert, A. I. Rivenes, J. A. Rivera, J. G. Roseland, Harry Schulman, Nathan H. Schwartz, D. O. Severson, Dr. Jacob B. Shaykin, Joseph H. Staller, J. Paul Stanley, Marvin J. Welfeld, Charles H. Westbrook, Walton Wetten, John A. Wincher.

SATURDAY AFTERNOON LECTURES OFFERED IN OCTOBER, NOVEMBER

Nine lectures on science and travel will be given on Saturday afternoons throughout October and November in the annual Autumn Course to be presented in the James Simpson Theatre of the Museum. All but one of the lectures will be illustrated with motion pictures in color; that lecture will use slides. The lectures begin at 2:30 P.M. Because of the limits of accommodations, the lectures are restricted to adults. Morning programs of free motion pictures for children will be given on the same Saturdays by the James Nelson and Anna Louise Raymond Foundation.

Subjects of the lectures in the Autumn Course range from big-game hunting in Africa to human evolution. There are lectures on the natural history of the various parts of the United States, on Peru from Inca days to the present, and on journeying across British Guiana to the Amazon, and there is a motion picture showing how the Museum prepares its elaborate habitat groups of animals and birds.

The dates, subjects, and lecturers booked for the Autumn Course are as follows:

October 2—Animals Unaware

Howard Cleaves

Mr. Cleaves is a specialist in making close-up views of camera-shy subjects in nature, using special photographic equipment that he devised for the purpose. Thus his motion pictures show animals that, not knowing they are under observation, act with complete naturalness.

October 9—Rivals of Nature

John W. Moyer

Mr. Moyer, for a number of years a staff taxidermist and now in charge of the Museum's Division of Motion Pictures, takes his audience behind the scenes in a museum. His films and his narrative show details of some of the strangest professions of modern times as well as the techniques whereby birds and animals are made to "live" in museum exhibits.

October 16—British Guiana to the Amazon

William G. Hassler

Mr. Hassler presents in story and film the highlights of a remarkable journey of 1,000 miles through jungle and savanna and down unmapped rivers to collect zoological and botanical specimens and visit primitive Indian tribes. Some of the Indians had never seen white men before. The expedition was sponsored by The American Museum of Natural History and the New York Botanical Garden.

October 23—Spring and Summer on the Prairies

Cleveland P. Grant

Mr. Grant, former member of the staff of this Museum, in recent years has become noted for his explorations, motion-picture photography, and lectures. A favorite with Museum audiences, he brings this time a delightful nature film that includes slow-motion studies of nesting birds, ducks in flight, and running deer. There are also recurring sequences on the growth of an orphaned fawn. Mr. Grant stresses the need for conservation of wild life.

October 30—The Pageant of Peru

Clifford J. Kamen

Peru's fabulous Inca ruins and its gold and silver mines are explored in Mr. Kamen's films and narrative. He presents the life of today's "prehistoric" Indian cultures in scenic sequences that range from the magnificence of the Andes to the source of the Amazon. Dense jungles are penetrated and lost cities brought to life.

November 6—Human Evolution

Dr. Sherwood L. Washburn

Dr. Washburn, a member of the faculty of the University of Chicago, where he teaches physical anthropology, will present a discussion of the highlights of human evolution based upon extensive research and a new approach to the study of man through observation of animals. He applies laboratory methods to the field of evolutionary research. The lecture is illustrated with slides.

November 13—From Coast to Crest

Alexander Sprunt

Since 1934, Mr. Sprunt has been a field investigator for the National Audubon Society. His lecture and films are described as "a vertical survey of wild life and scenery." He begins with studies of birds of the Gulf coast of Texas; he then carries his audience inland to the land of the Navajos in Arizona, the Grand Canyon, Colorado's Mesa Verde, and Wyoming's Grand Tetons and Yellowstone National Park.

November 20—A Southwest Story

Francis R. Line

Mr. Line uses a new idea in film technique. Against a background of some of the most colorful country in America, he has filmed the life story of a small boy. The result is a production with all the drama of a regular narrative movie but with the scenic beauty and charm of a travelogue and the absolute authenticity of a documentary. Victor, the boy, lives in a tiny village of southern Utah near Zion and Bryce canyons, the Kaibab Forest, and other great scenic areas. He visits the Hopi Indians working in remote villages; he observes the Zunis threshing wheat by primitive methods; he sees the Spanish-Americans of New Mexico harvesting their crops.

November 27—Safari in Africa

Murl Deusing

Mr. Deusing, a member of the staff of the Milwaukee Public Museum, presents the picture story of the American Museum of Natural History's recent Central African Expedition, under the leadership of Dr. James L. Clark. Three trucks, two hunting cars, and a power wagon make a cross-cut trek into the game country of the Masai Reserve in southwestern Kenya. After collecting the game of the region and filming an exciting battle between two bull giraffes the explorers proceed through primitive sections of Uganda, the Belgian Congo, and French Equatorial Africa. They climb the Ruwenzori Mountains into the lovely and weird cloud forest, descend into the jungle of rain forests in the Belgian Congo, and visit a camp of lively pygmies.

RESERVED SEATS FOR MEMBERS

No tickets are necessary for admission to these lectures. A section of the Theatre is reserved for Members of the Museum, each of whom is entitled to two reserved seats. Requests for these seats should be made in advance by telephone (WAbash 2-9410) or in writing, and seats will be held in the Member's name until 2:30 o'clock on the lecture day.

Ores Collected in Southwest

Mr. Robert Kriss Wyant, Curator of Economic Geology, and Mr. Harry E. Changnon, Curator of Exhibits, Geology, recently returned from a highly successful geological collecting trip to the southwestern United States. Ores and their associated minerals, to be used as exhibit and study material, were collected in several leading mining districts of the Southwest. Included were collections from the bauxite district of Arkansas, the copper and zinc district of Santa Rita, New Mexico, the Petaca pegmatite district of northern New Mexico, the molybdenum deposits at Questa, New Mexico, and several of the lead, silver, and gold districts of Colorado.

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Members are requested to inform the Museum promptly of changes of address.

CONSERVATION OF HABITATS

One of the accepted aims of a natural history museum is the dissemination of knowledge of animal and plant life. The important role of the "habitat group" in museum exhibition is demonstrated by its wide use and popularity. Such combinations of terrain with characteristic plants and animals approximate most closely the natural habitats in nature, which fall into notably distinct types. A habitat group may convey information regarding vegetation, type of topography, and climatic area as well as food, family, and other relationships between animals and plants and their surrounding environment. The visitor sees objects in their natural settings, often representing scenes thousands of miles away. And he has an opportunity to study and enjoy these scenes at his leisure. Habitat groups thus introduce the visitor to the synthetic sciences of ecology and biogeography.

Many of the habitat groups on exhibition in Chicago Natural History Museum are replicas of actual scenes still in existence in actual places. Among those in the Department of Botany (in which animals are the "accessories") are the tidal pools of the North Atlantic Coast, inhabited by sea anemones and star-fish, surrounded by green, red, and brown seaweeds; the South African desert scene, with its portrait of one of the most extraordinary of plants, the Welwitschia; and the Illinois woodland scene with our familiar wild flowers in their spring glory. The alpine zone of the Rocky Mountains and the giant water lily, the *Victoria regia* of the tropical swamps of South America, are idealized scenes typical of regions.

GOVERNMENTAL CONSERVATION

Intensive agriculture, grazing, various commercial interests, together with power dams and irrigation projects, are constantly reducing the areas occupied by many native species by destruction of their natural habitats. Thanks to national parks, national and state forests, game refuges, forest preserves, wild life sanctuaries, and wilderness areas, the United States and many other countries have had the foresight to preserve some typical areas of habitats that might otherwise have been wholly destroyed. But despite these efforts, many natural areas are gone forever, and relatively few remain untouched.

The governments of some tropical countries, in the Americas, in Africa, and in the East Indies, have had the wisdom to set aside natural areas as national parks or forest preserves, foreseeing that the spreading influence of man would have the same effect as in countries with a temperate climate. Destruction of such habitats with the increase in human population and with the impact of civilization in lumbering and road building threatens such beautiful birds as the cock-of-the-rock, rare orchids, and thousands of other animal and plant species.

In the United States, real-estate developments for cottage sites are threatening many localities where the showy lady slipper, one of the most beautiful of North American wild orchids, is still found. As it often grows in similar habitats with other beautiful wild flowers, such as the fringed gentian, all of them disappear together. Not only the plants growing in these places but the birds, insects, salamanders, and other animals found there are also affected. At the moment, the ivory-billed woodpecker is believed to be near extinction, already the fate of the heath hen and the passenger pigeon. Its last stronghold is found in virgin woods, where it still finds its characteristic food (insects living within the wood of large trees growing in virgin forests). The dwindling acreage occupied by virgin forest has forced this bird to its last retreat in the Singer tract in Louisiana. Even here it may already be extinct or doomed.

'TOO LITTLE, TOO LATE'

One may say, "Well, then, let us propagate such rare species and save them from extinction." Such efforts may have real success, as was the case with the American bison. Unfortunately, in the case of both animals and plants, it has often been a case of "too little and too late" to save a particular species. The only way to prevent extinction of many types of both plants and animals may be to save an extensive area of their "natural habitat." Then again, transplanting wild flowers to man-made habitats or wild animals to confinement where they are grown or bred under artificial conditions does not give one the same satisfaction as seeing them in their natural habitats. Nor, at best, does it always prevent extinction.

In the United States, with the increase in population and the destruction of many habitats through dams, drainage, real-estate developments, and varied commercial and private enterprises, combined with large-scale state and national projects, our natural habitats are more than ever in need of protection and conservation. The problem of saving certain plant or animal species turns out to be the problem of saving the habitat itself. For if all natural habitats are destroyed and supplanted by man-made cornfields, overgrazed deserts, lawns, building sites, sidewalks, and other phenomena of civilization, the last opportunity to study and enjoy our native animals and plants in their natural settings disappears. Conservation of natural habitats in sufficient areas to preserve their wild plants and animals and in sufficiently numerous areas to be accessible to all is the only means by which we can safeguard for posterity our priceless heritage of natural beauty.

—JULIAN A. STEYERMARK

Associate Curator of the Herbarium and Museum Representative, Conservation Council of Chicago

THIS MONTH'S COVER

To Americans in every walk of life the turkey has long symbolized the Thanksgiving season and all that it implies. Early colonists along the eastern seaboard as well as the Pilgrim fathers in New England held it in highest esteem as an important, if wary, source of food. Today, centuries later, the wild turkey has disappeared from most of its original range. Although now replaced on the Thanksgiving table by the domesticated descendant of a Mexican variety, the wild turkey lives on in American tradition and folklore of this season. The wild turkey, examples of which appear in a Museum habitat group in Hall 20, part of which is pictured on this month's BULLETIN cover, was last known in the Chicago area about 1878. It still occurs locally as a game bird in isolated areas along the middle and southern parts of the eastern seaboard, the Gulf Coast, and in the Southwest. The Museum group represents the birds in a Louisiana scene.

PEACE FROM 4000 B. C. TO A. D. 1000 IN INDIAN UTOPIA

Southwest Expedition Fills in Time-Gaps in American Prehistory

BY PAUL S. MARTIN AND LEONARD G. JOHNSON

The Museum's 1948 Archaeological Expedition to the Southwest returned to Chicago from New Mexico in early October. Under the leadership of Dr. Paul S. Martin, Chief Curator of Anthropology, for whom it was the fifteenth season of operations in this district, the work of other years was continued. The expedition was concerned with investigating further the history of Pine Lawn Valley—located in west central New Mexico about 100 miles north of Silver City. Besides Dr. Martin, the scientific staff included Dr. John B. Rinaldo, Assistant in Archaeology, Dr. Ernst Antevs, Research Associate in Glacial Geology, Mr. Leonard G. Johnson, Mr. W. T. Egan, Mr. Irving Wood, and Mrs. Martha Perry. In the field a corps of local laborers was recruited to aid in excavations. The work of the expedition was begun in the middle of June.

TO A world threatened with the necessity of building underground to escape from atomic bombs, bacterial warfare, and other predicted horrors, the 1948 Archaeological Expedition to the Southwest brings news of Americans who in very early times gave up a free life of living under the stars to dig themselves in for approximately 500 years, emerging then to build themselves homes above the ground—all this without signs of chaos or warfare.

PAUL S. MARTIN
Expedition Leader

About 6,000 years ago, an ancient Indian people, known now as the Cochise Indians, roamed the ridges of southwestern New Mexico in quest of water. Then, as now, water was scarce in the Southwest. Then, as now, men and animals camped near sources of the precious water. The prehistoric and little-known Cochise Indians of 6,000 years ago wandered afar in search of the few springs from which water seeped. Their trail apparently led them from southeastern Arizona into New Mexico, and there they found an arroyo into which a small spring flowed.

TOOLS UNEARTHED

Here, at the same flowing spring, named Wet Leggett, 6,000 years later, members of our expedition found the stone tools left by the Cochise Indians. Time has hidden almost all skeletal traces of these Indians, and we are indeed grateful to have located at least the grinding tools of stone (manos and metates) and remains of the ancient fires and hearths left by the Cochise Indians.

The process of discovery is interesting, laborious, and tedious. It consists of walking for days up and down the ancient stream bed, which is eight to ten feet below the earth's present surface. Jutting from the arroyo walls in great profusion are rocks of all shapes and sizes. Even for the expert with trained eyes and years of experience it is a problem to determine which of the rocks may be Indian artifacts. Each probable tool has to be dug out of the cement-like arroyo walls at least to the point where one can determine definitely whether the stone is an Indian tool or only a piece of rock.

AGE DETERMINED

In Wet Leggett, embedded in the arroyo walls at depths down to twelve feet below the earth's surface, the expedition located the only remaining evidence of the ancient Cochise Indians.

Dr. Antevs, well-known student of climatic history, by studying the different geological strata was able to determine the age of the stone tools. By close study of the stone tools themselves, we were able to identify them as belonging to the Chiricahua period of the Cochise culture. The archaeologist has placed this period of the Cochise culture as dating from 10,000 to 5,000 years ago, and this estimate has been confirmed and strengthened by the careful and thorough work of Dr. Antevs.

It is by work of this sort that we are able to reconstruct the picture of ancient American Indians, a people that must have been very similar to the Neanderthalers, the Stone Age race of the Old World. Both were roving, hunting bands, constantly moving in search of food and water, living at the bare subsistence level, without the leisure required to develop any of the niceties that we term "civilization."

THE FIRST HOUSES

There is a large, empty time-gap between the roving, houseless Cochise Indians and the first houses of the Mogollones. The first pit-house (a cellar with a roof) in this area is tentatively dated at A.D. 500. The pit-house tradition retains its dominance for the next 500 years.

One of the last and certainly one of the most grandiose houses is Pit-house K, located nine miles south of Reserve on a low ridge sparsely sprinkled with oak and pinyon trees. It is the largest Indian house uncovered during the 1948 season, measuring approximately 28 by 28 feet and about 4 feet in depth. It was the last word in pit-houses, for it probably had to compete with the new-fangled surface houses, the pueblos. Thus, after 400 years of pit-house dwelling these ancient American Indians began to emerge from their underground houses to construct surface buildings.

There were many innovations in Pit-house K. For example, the older type pit-houses had had long tunnel entryways

(*Continued on page 5, column 2*)

6,000-YEAR-OLD IMPLEMENTS UNEARTHED

The camera finds Dr. Paul S. Martin, Chief Curator of Anthropology and leader of the Archaeological Expedition to the Southwest, beside an old stream-bed twelve feet below the surface level of the surrounding terrain, where he has discovered ancient grinding stones and other tools of the prehistoric Cochise Indians. The 1948 season's work of the expedition was especially successful in breaking through the veil of mystery that has obscured knowledge of this long-extinct tribe.

EVERY BIRD IS DIFFERENT FROM EVERY OTHER BIRD

By AUSTIN L. RAND
CURATOR OF BIRDS

VARIATION is the rule in nature. To demonstrate this to yourself the simplest way is to try to find two maple leaves or oak leaves that are exactly alike. It can't be done. The most similar you can find will still differ in details. Another way to have variation within a species impressed on you is to stand at the corner of State and Van Buren and note how different are the individuals of the human species that go by.

In birds it is the same. No two are exactly alike in appearance. They differ in size, in color, and in pattern. Sometimes even in a casual aquaintance with the birds on your lawn, there will be a few you can recognize individually: an especially bright bluejay, a robin with an unusually red breast, or a yellow warbler with extra-heavy chestnut breast markings. But even the sparrows that look exactly alike to a casual glance will, on closer study, turn out to be recognizable as individuals.

A new exhibit has been installed in Hall 21 to show this sort of variation. Familiar types of birds, such as Canada warblers, towhees, downy woodpeckers, barn swallows, purple martins, and ruffed grouse of the same age and sex, have been chosen from our series of study skins. Variations in color, in pattern and size are shown. Those shown are not freaks; there are no albino blackbirds, nor starlings with deformed bills, but rather the normal "run of the mine" variations, which are connected by other individual variations with a "normal" or "average" bird of the species.

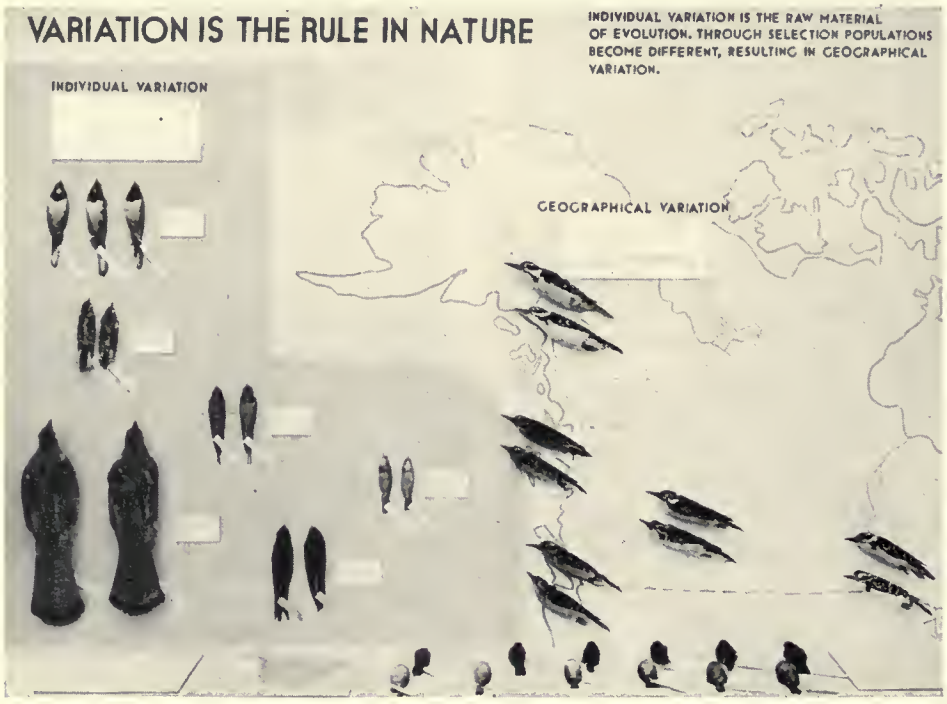
DISPARITY IN TRAITS

Variation occurs not only in physical appearance. There is reason to believe that variation exists in every attribute: in wildness; in agressiveness; in agility; in activity; in acuity of senses; in short, in every aspect of the bird.

This variation is of fundamental importance in the scheme of things. The little differences that make one bird more attractive as a mate, or slightly quicker to catch a worm, or slightly less conspicuous to an enemy, or better able to withstand the long winter nights or long migrations, may mean the difference between surviving and leaving progeny, and perishing; in fact, between life and death.

When we realize that only a part of the birds hatched each year can possibly reach maturity and breed (else we would be overrun with birds, and have a condition of overpopulation in which there would be no room for them), we begin to see the implications of variation.

Only a part of the population will survive in this "struggle for existence." Which one will survive is determined by a principle called "survival of the fittest." This is our phrase for the over-all effects that weed out the weaker individuals, whose physical and mental equipment is at the extreme of variations of those less well adapted to their environment, and allow only the stronger, better adapted, to survive and perpetuate the species. In other words, we conclude that selection, acting on variation, operates to "improve the species and make it better equipped to carry on its life."


VARIATION IS THE RULE IN NATURE
INDIVIDUAL VARIATION IS THE RAW MATERIAL OF EVOLUTION. THROUGH SELECTION POPULATIONS BECOME DIFFERENT, RESULTING IN GEOGRAPHICAL VARIATION.
INDIVIDUAL VARIATION
GEOGRAPHICAL VARIATION

COLOR, PATTERN AND SIZE VARIATIONS IN BIRDS OF SAME SPECIES

The exhibit, prepared by Miss Norma Lockwood under the direction of Dr. Austin L. Rand, Curator of Birds, with the assistance of Mr. Kenneth Woelck, illustrates its subject with familiar kinds of birds such as Canada warblers, towhees, downy woodpeckers, barn swallows, purple martins, and ruffed grouse.

CHANGE NEVER CEASES

This implies that every species is continually, slowly changing. And this is just what is happening. It happens so slowly that our collection of bird skins and our written records cannot detect it. But when we turn to the paleontological record, the story gathered from a study of fossils, we find this is just what has happened.

The gradual change from an early form through successive stages to the one we know at the present day is perhaps best known for the horse. But it's probably true of all forms we know. And there's no indication the process has stopped; it is still going on. The present, which we know, is just a thin section through endless time.

We have another line of evidence that serves to establish the fact that selection acts on variation. Every place differs at least slightly from every other place, and thus selection differs in each place, choosing the birds most fitted. Gradually the birds from one area become different from those in another; the different populations come to have differences you can easily see. This is geographical variation and is shown by the hairy woodpeckers on the right-hand side of the new exhibit. With these woodpeckers, the differences are great enough so that most of the individuals from considerable areas can be recognized and referred to their populations on examination. When this degree of differentiation has been attained, the various populations are said to form different subspecies. As is evident, the subspecies is a human concept; it is a matter of naming populations when they have differed enough so that human eyes can recognize a considerable proportion of the individuals as alike. Biologically they still all belong to the same group of individuals in the species, and the variation is just as real whether dignified by name or not. The subspecific names for the more readily recognizable forms are a convenience in talking about variation.

EFFECTS OF ENVIRONMENT

Variation sometimes tends to follow certain trends in certain environments; in an arid country birds (and other animals) tend to become pale in color and those from humid areas to be dark in color, perhaps in part to harmonize better with their background and so be more protectively colored. Birds from more northern areas

tend to be larger than their closest relatives in more southern areas, perhaps an adaptation to conserve heat; the larger birds, having proportionately less body surface to bulk, thus lose less heat.

Song sparrows, of which a few examples are shown in the bottom of the case, are well known as a plastic group, becoming so modified and adapted to their particular local environment that many subspecies can be recognized. Those shown represent an area from arid, hot Arizona to the humid, cool Alaska coast and show both the trends outlined above, being darker and larger in the humid northwest and smaller and paler in the hot arid country.

We have traced the process of change from variation in individuals in a population to variation between populations within a species. We have seen that populations with well-marked differences are called subspecies.

SPECIES FROM SUBSPECIES

The next progressive step is when these subspecies become different enough to be called species. But up to the subspecies level the differences may be in the bird's physical appearance; they are of degree only. Biologically birds are still capable of interbreeding freely even though they may look quite different. For two subspecies to become different enough to be considered true species there must develop a difference of another kind, a biological difference. The individuals of two different species do not interbreed freely. Subspecies replace each other geographically. A species can have only one subspecies living and breeding in an area. But many species can breed in the same area. A biological factor prevents them interbreeding. It may be physical, or it may be mental.

This sort of difference, the difference growing up between two populations that results in the two populations becoming fully distinct species, seems impossible of attainment while the subspecies are spread continuously over an area. It is only when populations are isolated, in a physical sense, as on islands, that species evolve from subspecies. This aspect of speciation is diagrammed on the exhibit "Species Evolve Only in Isolation" in the alcove adjacent to the one housing this new exhibit (and was discussed in the February BULLETIN, page 4).

The two exhibits "Variation is the Rule in Nature" and "Species Evolve Only in Isolation" actually show different parts of the same thing, the course of evolution of species. To recapitulate, individuals vary; selection acting on them causes populations to vary; when populations are isolated they may vary enough to become species.

RAW MATERIAL OF EVOLUTION

Thus individual variation is the raw material of evolution, the stuff of which new species are made, little by little, over a long period.

Such conclusions as this are the result of studies of large numbers of specimens, representing the "thin section through endless time," the stage at which we now stand in the continuing process of evolution. The studies on birds in museum collections have had an important place in reaching such widely applicable conclusions. It is perhaps fitting that in this new exhibit the birds shown are not mounted birds but are the conventional study skins such as are used in museums for carrying on such research. They are made to resemble a dead bird, lying on its back, with the legs, to which a label is tied, crossed. Specimens such as these form the bulk of the research material of a bird collection. From the label, the date and place of capture and sex, and perhaps other data, can be read, and a study of the characters of the specimen yields further data.

The new case was prepared by Miss Norma Lockwood of the Museum art staff, under the direction of the Curator of Birds and with the aid of Mr. Kenneth Woelck.

PEACE, 4000 B. C. TO A. D. 1000, IN THE SOUTHWEST

(Continued from page 3)

while the occupants of Pit-house K entered through the roof by means of a ladder. The obsolete pit-house had no indoor firepit, but in the center of Pit-house K a pit containing gray ashes was discovered. Around the north wall there was a good-sized adobe bench and in the center of the house, forming a square around the firepit, were four long grooves. As charcoal was found in these grooves, they presumably contained logs that had been plastered over, thus forming a cozy bench around the fire.

A house the size of Pit-house K, if it was a family unit, must have been the chief's house, for most certainly the man-hours of digging needed to construct it must have been enormous and the entire tribe would have been required to work on it. It is more probable, however, that Pit-house K was a ceremonial chamber and that its construction was a male communal project, for it is known that in later times women were not permitted to have anything to do with the ceremonial chambers or kivas.

TWICE-BURIED INDIAN HOUSES

It took an expedition crew of five husky workmen using good sharp steel picks and shovels almost two weeks to excavate Pit-house K. It must have taken the Indians twice as long to build it, not counting the time consumed in cutting and hauling the huge logs used to support the roof (six logs, each 1–1¼ feet in diameter) and in constructing the roof itself.

At the end of the season's excavations, the expedition crew had to refill the houses that had been dug. Backfilling, an essential part of the archaeological season, is required by the government permit. The hot and constant sun beat down on the windless ridge as six men wielded shovels. Huge dirt mounds had to be moved back into the ancient Indian pit-houses that had been excavated. Fourteen Indian houses had to be reburied.

But as the houses were refilled, one thought of the knowledge scooped from New Mexico's hard-baked earth—the double occupation of Pit-house C (its entrance had been converted into a ventilator), the mysteriously scattered male skeleton of Pit-house D, and the curious wall cupboard of Pit-house E. Pit-house F had led us into an unknown and later period of Indian prehistory, and Pit-house G filled in another time gap, the period from A.D. 500 to 900. Pit-houses F and G had revealed the beginnings of decorated pottery along with many additional discoveries. Pit-house H had provided more needed evidence for the above-mentioned time periods, and Pit-house I, dated A.D. 900–1050, had provided a nicely completed time sequence. Pit-house K, the huge rectangular house, provided an exciting contrast to the ordinary Indian family dwellings.

Pit-house L was a shapeless house because of numerous pits dug into the walls, but two of these pits were so dug as to form a perfect figure 8. Pit-house M had a short, stubby entryway and Surface House No. 1 proved a lucky find because of the wealth of pottery and stone tools it yielded. Pit-house N was a small, deep, perfectly formed house while Pit-house O was irregular with an extremely rough floor.

Viewing the collected evidence covering a span of time from 4000 B.C. to A.D. 1000, we find the broad outlines of a fascinating story of ancient American Indians. First these Indians roved, houseless, in quest of water and food. Thousands of years later they dug into the earth and for 500 years developed and stylized their cellars with roofs, only to emerge again into the bright sunlight, but this time to build on the earth's surface.

It is the story of man's past development, sketchy to be sure, but a story that will be better filled out and better understood with further excavation.

Radio Programs for Children

Stories prepared by the staff of the James Nelson and Anna Louise Raymond Foundation are presented Saturdays at 5:15 P.M. and Sunday mornings at 9 on the "The Children's Corner," a program broadcast by radio station WCFL.

A 'GI' REVISITS PACIFIC TO COLLECT INSECTS

By HENRY S. DYBAS
ASSISTANT CURATOR OF INSECTS

One of the by-products of the recent war was an increased interest in the people and the natural history of many previously little-known Pacific islands. Hundreds of thousands of Americans in our armed forces visited many island groups that had been seen before by only a handful of travelers. Together with so many others, I was a recipient of one of the "traveling fellowships" then so liberally provided by our government to men in uniform. And the period spent in the islands of Micronesia was a rich experience, at least from the natural-history standpoint.

When in the fall of 1947 the opportunity arose to revisit Micronesia, I looked forward to visiting certain islands I had not previously seen, and I also had some curiosity as to what had happened to some of the busy military bases two years after the war. This time the trip was under the auspices of the Pacific Science Board of the National Research Council and was for the purpose of studying the interesting and rather unusual insect life of the Palau Islands in Micronesia. I remained until late spring, 1948.

The Palaus are a group of islands lying about 600 miles to the east of the Philippines. The two southern islands, Peleliu and Angaur, figured in the news during the war as scenes of hard-fought invasions. The occupation of Peleliu involved a massive military assault that virtually destroyed the original vegetation over most of the island and left a reminder of its intensity in such names as Bloody Nose Ridge. After the occupation, the construction of roads, air strips, supply depots, and troop installations further changed the appearance of the island. At the height of this activity, the island was a busy and crowded military base and had little of the typical atmosphere of a South Sea island.

NATURE COVERS WAR SCARS

Today the roads are quiet and the quonset huts lie empty, with their screens rusting and broken through. Grasses, shrubs, vines, and small trees are beginning to cover the air strips, roadsides, and bare spots. In time, the air of desolation lying over the island can be expected to disappear as the native vegetation conceals the scars of war.

Babeldaob, the northernmost and largest island in the group, was by-passed and suffered little damage except to military installations. I selected the quiet and picturesque village of Ulimang on the northeast coast as a base for insect collecting. The village was situated on the seashore in an old coconut grove planted during the time of the German occupation before World War I. The houses were connected by neat sandy trails, which were swept daily. The chief of the village had the very un-Palauan name of Charlie Gibbons, which he had inherited from his grandfather, a Jamaican Negro who had jumped ship in the last century and married a chieftain's daughter. By all accounts, the old Charlie Gibbons was a man of parts and his descendants are now prominent persons in the community.

Remnants of the old Palau life were conspicuous in the area. A few of the carved men's clubhouses were still standing but were in bad repair. Old stone trails and hut platforms, made of smooth, closely placed stones, were all through the area and gave evidence of a much greater population, with a stronger social organization, than now inhabits the region. The ridge of hills behind the village had been cleared and partly terraced in past times, and hut-sites and bits of pottery lying on the ground suggested the former presence of a village on the summit. Remnants of the old Palau handicraft, in the form of tortoise-shell spoons and carved platters with mother-of-pearl inlay, were still to be found in various homes in the village. The courteous yet friendly dignity of the villagers contributed much to the impression of charm and beauty of the village.

COLLECTING IS VARIED

From this pleasant base, daily trips were made, in search of insects, into the various kinds of vegetation associations in the vicinity. A typical day's collecting trip would take me, in company with my Palau boy, up the grassy slope of the terraced ridge behind the village. After a short but hot climb we would reach the top and pause to get the fresh breeze from the sea and to enjoy the view of the village below and the sea and the reef beyond. Then we would dip down into the valley behind the ridge and spend the day collecting leisurely along some forested stream-side. At times we would follow an old stone trail, whose stones were worn smooth by generations of bare feet, to some unusually attractive glade. One such spot, near a deep pool in the stream, must have once impressed some aboriginal Palau natives as well, for a stone platform marked the site of a hut now long gone.

These trips, as well as those elsewhere in the island group, gradually disclosed the interesting insect fauna of the Palaus. In general, the insects were similar to those of other island groups in Micronesia, but there were many local developments that occurred nowhere else, as far as is known. Despite the uniformly warm climate, the large and showy insects one usually associates with the tropics were largely absent. Most of the insects in Palau were small and obscure types. Moreover, many of the groups of insects that are dominant in continental areas were absent or were represented by few forms. All of these distinctive features of the insects of oceanic islands are a result of special conditions that apply to islands and not to continental areas. Of prime importance, among these special conditions, is the sea barrier. All of the island inhabitants somehow had to cross this expanse of salt water in order to colonize the island. In examining the insects of an island, it is evident that many major groups of insects were unable to cross the sea, or were only partially successful. Those that did manage to cross by being accidentally carried on a raft of driftwood, or by being blown by high winds, or by some other form of accidental dispersal, often found favorable conditions, free from the struggle for existence, which permitted rapid development along special lines.

These are the special features of animal life on oceanic islands that interested the young Charles Darwin on the voyage of the *Beagle* more than a century ago. And the questions posed, particularly during his visit to the Galapagos Islands, contributed much to the thinking that led later to the formulation of his theory of evolution.

NOVEMBER LECTURE TOURS, DAILY EXCEPT SUNDAYS

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays (the Friday tours open with an introductory lecture and slides or films in the Meeting Room on the second floor of the Museum); a schedule of these follows:

Wed., Nov. 3—Life Usually Unseen—Microscopic Plants and Animals (*Marie Svoboda*).

Fri., Nov. 5—Activities of a Museum. Illustrated introduction in Meeting Room (*Lorain Farmer*).

Wed., Nov. 10—Cats—Wild and Tame (National Cat Week) (*Harriet Smith*).

Fri., Nov. 12—Readin', 'Ritin', and 'Rithmetic—Schooling Throughout the World (American Education Week). Illustrated introduction in Meeting Room (*June Buchwald*).

Wed., Nov. 17—Natural History Facts and Fallacies (*Lorain Farmer*).

Fri., Nov. 19—Story of the Dunes. Illustrated introduction in Meeting Room (*Marie Svoboda*).

Wed., Nov. 24—Origins of Modern Dress (*June Buchwald*).

Fri., Nov. 26—Harvest Festivals. Illustrated introduction in Meeting Room (*Harriet Smith*).

SATURDAY LECTURES THROUGH NOVEMBER

Four more lectures on science and travel will be given on Saturday afternoons throughout November in the annual Autumn Course presented in the James Simpson Theatre of the Museum. All but one of the

HOPI INDIAN DRYING APRICOTS

The sun beating on his house-top makes an ideal place for the purpose. This is a scene from the film to be shown at the Museum on November 20 by Francis R. Line in connection with his lecture "A Southwest Story."

lectures will be illustrated with motion pictures in color; that lecture will use slides. The lectures begin at 2:30 P.M. Because of the limits of accommodations, the lectures are restricted to adults. Morning programs of free motion pictures for children will be given on the same Saturdays by the Raymond Foundation.

The dates, subjects, and lecturers booked for the Autumn Course are as follows:

November 6—HUMAN EVOLUTION
Dr. Sherwood L. Washburn

November 13—FROM COAST TO CREST
Alexander Sprunt

November 20—A SOUTHWEST STORY
Francis R. Line

November 27—SAFARI IN AFRICA
Murl Deusing

No tickets are necessary for admission to these lectures. A section of the Theatre is reserved for Members of the Museum, each of whom is entitled to two reserved seats. Requests for these seats should be made in advance by telephone (WAbash 2-9410) or in writing, and seats will be held in the Member's name until 2:30 o'clock on the lecture day.

On your visits to the Museum, pause midway and relax while having lunch in the cafeteria.

Native Uprising Halts Expedition

The projected Rush Watkins Expedition to Malaya, to have been conducted by Mr. Rush Watkins, Dr. Austin L. Rand, Curator of Birds, and Staff Taxidermist Frank C. Wonder, has been postponed. Native uprisings in the British territory to have been explored caused the State Department to withhold permission for departure of the expedition.

MORE SATURDAY MORNING CHILDREN'S MOVIES

The James Nelson and Anna Louise Raymond Foundation will present the final four of its autumn series of free motion-picture programs for children on Saturday mornings in November. All of these programs will be given at 10:30 A.M. in the James Simpson Theatre of the Museum. In addition to motion pictures, lecturers will appear on two of the programs.

Children may come alone, accompanied by adults, or in groups from schools, etc. No tickets are needed.

Following is an outline of the programs:

November 6—THE PEIPING FAMILY
A middle-class family in China
Also a cartoon

November 13—BACKYARD ADVENTURE
Lecture by Allan Cruickshank, National Audubon Society

November 20—JERRY PULLS THE STRINGS
The story of coffee told by puppets in a color motion picture

November 27—BACKYARD SAFARI
Animals close to your home
Lecture by Murl Deusing, Milwaukee Public Museum

NEW MEMBERS

The following persons became Museum Members between September 14 and October 12:

Life Members

Ernest A. Dahl

Associate Members

John H. Galgano, Paul M. Hammaker, Justin Kaufman, Laurence E. Schwab.

Annual Members

Otto E. Bull, Edward G. Chase, Henry P. Draper, Paul Dudak, DeWitt Endicott, Thomas W. Evans, Edwin P. Fifelski, Mrs. Katrinka Fisher, Paul G. Hensel, Jr., Carl W. Koehn, Victor A. Kos, Joseph Lowitz, Miss Caryl A. Lowry, O. O. Mallegg, C. R. McEldowney, James V. McGuigan, Daniel E. Noble, Edward E. Novak, W. H. Noyes, Jr., M. B. Osburn, Robert Platt, Theodore Revzan, Martin C. Rhodes, Earle H. Ritzwoller, Miss Inez M. Schick, Dr. Bertha VanHoosen, R. B. Weaver.

EXPEDITION TO COLLECT MAMMALS IN COLOMBIA

Assistant Curator Philip Hershkovitz of the Division of Mammals will leave in November as head of the Museum's first zoological expedition to Colombia. Approximately two years will be spent in collecting and in studying the factors involved in the distribution of mammals.

The leader of the expedition is no stranger to the Latin-American republic. As the Walter Rathbone Bacon Traveling Scholar of the Smithsonian Institution, Mr. Hershkovitz investigated the mammalian fauna of the northern part of the country for nearly two years between 1941 and 1943. His experience in South America includes four years of explorations in Ecuador and the upper Amazonian region.

Now it is planned to make a survey of each of the major geographical subdivisions of Colombia. The areas covered will range from the humid tropical forests of the Chocó on the Pacific coast to the cold grasslands above timberline in the Andes, and from the grassy plains and gallery forests of the Orinoco River region to the vast virgin forests of the Amazonian region.

Rich as the Museum collection is in specimens of South American mammals, the representation from Colombia is negligible. Special attempts will be made to secure some of the rare species, such as the hairy mountain tapir, the pudu, a dwarf deer that stands about 12 inches high, and a variety of monkeys, from the red howler, the largest of American simians, down to the pygmy marmoset, which measures barely 6 inches in length exclusive of its tail.

The effort to collect as large a representation as possible of Colombian mammals does not mean that other classes of animals will escape the attention of the expedition. External parasites, whether from a mouse, a vampire bat, or a spectacled bear, will be catalogued and preserved in alcohol. Frogs, lizards, and snakes captured and "pickled" provide some consolation to the mammalogist for trapless nights and gameless days. Even the bird destined for the dinner pot must first contribute its feathered skin to the expedition's collecting chest.

Taxpayer's Complaint

The Washington Biological Survey, which puts metal bands on wild birds to study their migratory habits, recently ordered new bands with different wording.

They now read: "Notify Fish and Wildlife Services, Washington, D.C." Formerly the bands said simply, "Wash. Biol. Surv."

Unofficial explanation of the change: An irate taxpayer's letter complained, "Sirs, I shot one of your pet crows and followed instructions. I washed it, I boiled it, and I surved it. It was terrible. Stop fooling the people." —*Chicago Daily News*

ZOOLOGICAL EXPEDITION TO MEXICO RETURNS

The Zoological Expedition to Mexico, with Mr. Melvin A. Traylor, Jr., Associate in the Division of Birds, in charge, returned September 20 to the Museum after a successful six weeks of collecting in central Veracruz. A total of 523 birds, twelve mammals, and four snakes was brought back.

The first collecting station was near Potrero Viejo, just outside of Córdoba, in the tropical zone. This was a particularly valuable region in which to collect, as the hacienda at Potrero Viejo was the home of the famous naturalist F. Sumichrast for many years and was undoubtedly the locality at which he took many of his type specimens. The present owner of the hacienda, Mr. Dyfrig McH. Forbes, manager of the Engenio Potrero, extended every kindness to the expedition, and it was through his assistance that 270 birds were collected there in three weeks.

From Córdoba the expedition moved to Teziutlán, and a camp was established about eight miles out of the city at an elevation of 5,000 feet, in the subtropical zone. Because of the precipitous nature of this region it is seldom hunted, and many species were found there that are no longer found around Jalapa and Orizaba, localities at the same altitude but in heavily cultivated regions. Two weeks were spent at Teziutlán where 160 birds were collected.

The final camp was made in the pine forests on the slopes of the Cofre de Perote at 8,500 feet. At this locality the expedition had the luxury of having for its sole use an abandoned tuberculosis sanitarium, one that the Mexican government had begun but never finished, abandoning it in favor of a more modern building a half-mile away. Here a week was spent in collecting 90 specimens of temperate-zone birds to round out an altitudinal cross-section of Veracruz bird life.

Visiting Hours Change

Museum hours, which have been 9 A.M. to 5 P.M. in the autumn, change to the winter schedule—9 A.M. to 4 P.M., November 1 to February 28.

STAFF NOTES

Dr. Julian A. Steyermark, Associate Curator of the Herbarium, conducted a botanical field trip for graduate students in systematic botany last month. The trip was in areas of southern Missouri, where explorations were made to illustrate certain features of vegetation. The students were from the Henry Shaw School of Botany, connected with Washington University and the Missouri Botanical Garden, St. Louis. Dr. Steyermark is an honorary research associate for the Botanical Garden.... **Mr. Rodger Mitchell,** a temporary appointee on the staff of the Division of Insects, has returned from the field; he was a member of the Guatemala Zoological Expedition. **Mr. Luis de la Torre,** mammalogist, is still in Guatemala.... **Dr. Paul S. Martin,** Chief Curator of Anthropology, told of his recent expedition to the Southwest on the "20th Century" radio program over station WENR.... **Dr. Austin L. Rand,** Curator of Birds, represented the Museum at the meeting of the American Ornithologists' Union held in Omaha, October 11–14.... **Mr. Donald Collier,** Curator of South American Ethnology and Archaeology, lectured recently at the Cranbrook Institute of Science, Bloomfield Hills, Michigan, on the Tairona culture of Colombia.... **Mr. Patrick Walsh,** pensioner, died recently. He was pensioned on January 1, 1941, after nearly forty-seven years of service. Mr. Walsh was employed in the Maintenance Division in 1894. In 1905 he joined the Guard Force, where he remained until retirement.

PANEL OF JUDGES NAMED FOR NATURE PHOTOS

Preparations are going forward for the Fourth Chicago International Nature Photography Exhibition to be held at the Museum under the sponsorship of the Nature Camera Club of Chicago.

The camera club is now ready to receive entries from both amateur and professional photographers. The deadline for entries is January 17, 1949. Judging will take place on January 22. Selected photographs will be exhibited at the Museum during the entire month of February.

The contest and exhibition will be in two divisions, prints and color transparencies. There will be three classifications of pictures in each division: *Animal Life*, *Plant Life*, and *General*—the last including scenery, geological subjects, clouds, and other nature manifestations outside the two specific classifications. First prize silver medals, ribbons, and other awards will be made in each classification of each division.

The judges will be: Dr. Hugh C. Cutler, the Museum's Curator of Economic Botany; Mr. Eugene S. Richardson, Jr., Curator of Fossil Invertebrates; Mr. G. E. Dahlby, photographer; Mr. Ralph Graham, Assistant Director, Chicago Zoological Park; and Mr. J. Philip Wahlman, photographer and associate of the American Photographic Society.

All persons interested in submitting entries are urged to communicate with the Museum or Mrs. Louise Broman Janson, 6252 South Kedzie Avenue, Chicago 28, for entry forms and further information.

GOLDEN BERYL EXHIBITED

A large Brazilian golden beryl of excellent gem quality and high intrinsic value was recently received as a gift from Dr. J. Daniel Willems, of Chicago. Weighing 34½ carats, the stone is beautifully cut to bring out all the natural brilliance for which beryls are so well known.

The gem is not only of exceptional size but is unique because it was cut and polished by Dr. Willems himself, who has, as a hobby, developed many techniques for cutting and polishing gem stones. It has been added to the exhibits in H. N. Higinbotham Hall (Hall 31).

Modern Exhibit Technique

Typifying the most modern trend of museum methods in simplifying and vitalizing exhibits are the displays in the Hall of the Archaeology of the New World (Hall B), in which a minimum of artifacts is combined by graphic techniques with easily comprehended illustrative material and presented in striking color schemes with the latest lighting effects. These exhibits contrast sharply with earlier displays of long rows of pottery objects, weapons, implements.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: Percy W. Cump, Jr., Chicago—a model of a canoe, Trobriand Island.

Department of Botany:

From: Prof. T. A. Stephenson, Aberystwyth, Wales—500 specimens of algae, eastern Canada.

Department of Geology:

From: New Jersey Zinc Co., N. Y.—19 rare mineral specimens; H. R. Straight, Redfield, Ia.—a variscite specimen; Dr. J. Daniel Willems, Chicago—a golden beryl, step cut (rectangular), Minas Geraes, Brazil; Dr. and Mrs. R. H. Whitfield, Evanston, Ill.—fossil collections, including plants, invertebrates, insects, and fish, Iowa and Colorado; James M. DuPont, Chatham, N. J.—2 specimens of silicified wood, New Jersey.

Department of Zoology:

From: Walter Buchen, Mombasa, Kenya Colony, Africa—77 bird study skins, Africa; Dr. Charles L. Remington, New Haven, Conn.—1,149 insects, chiefly beetles, New Caledonia; Ross Allen, Ocala, Fla.—a snake, Mexico; Walter L. Necker, Chicago—5 bats, New Mexico; Dr. Hans Schlesch, Copenhagen, Denmark—5 lots of land and freshwater shells, Paraguay; Chicago Zoological Society, Brookfield, Ill.—a boomslang; Maj. Howard T. Wright, U. S. Army—5 lots of invertebrates, Japan.

Division of Motion Pictures:

From: Felt & Tarrant Manufacturing Co., Chicago—125 feet of color print of the groups in the Hall of the Stone Age of the Old World.

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Chicago Natural History Museum

Chicago Natural History Museum

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Members are requested to inform the Museum promptly of changes of address.

ARTHUR GEORGE RUECKERT 1891—1948

The unexpected death of Staff Artist Arthur G. Rueckert on October 28 came as a shock to his friends and associates, by whom he was held in high esteem for his many admirable traits of character and unquestioned ability as artist and museum technician. His death marks the passing of another of the never numerous individuals of a retiring generation who, by reason of their native interest in natural history coupled with a combination of craftsman skills and ability as an artist, were admirably fitted to contribute much to the development of exhibition work in natural history museums.

A. G. RUECKERT

Mr. Rueckert received early training and practical experience in his chosen vocation, first with a firm of commercial taxidermists, then with the Illinois Department of Agriculture and the Chicago Academy of Sciences. He joined the staff of the Museum in 1923 as taxidermist-preparator in the N. W. Harris Public School Extension. In the division of taxidermy of the Department of Zoology, to which he was soon transferred, opportunities arose for the fullest development of his many talents as artist and technician, and also as collector on field trips and expeditions, the principal one of which was the Second Rawson-MacMillan Sub-Arctic Expedition of Field Museum in 1927–28.

It was characteristic of Mr. Rueckert to apply himself wholly to the task at hand and first and always to acquaint himself thoroughly with the subject matter of a proposed exhibit before executing plans and beginning construction. All his work was conspicuous for its conscientious attention to detail and the clean-cut accuracy of its portrayal. Taxidermy in all its categories of fish, reptiles, birds, and mammals, the making of sketches of many kinds, were but some of the elements of his versatility.

Mr. Rueckert's talent for drawing and painting, which he developed through schooling at the Art Institute of Chicago, qualified him as an understudy of the late Charles Abel Corwin. In 1939, shortly after the latter's death, Mr. Rueckert was appointed as his successor as Staff Artist. Many of the backgrounds in habitat groups and a number of large mural paintings that were done subsequently by Mr. Rueckert compare favorably with the best of their kind. Always modest, he deprecated his status as an artist and claimed only to be a painter.

The loss to the Museum by his death is great. Valued workers like Mr. Rueckert are the product of a peculiar concomitance of circumstances that are not likely to recur in the history of a museum. The total of their skill is based on native talent and interests nurtured through a variety of experiences over a long period of time and covering a stage in Museum development that, once having passed, will not occur again.

THE NAVAHO—AN ESSAY IN PHOTOGRAPHS

In recent months, the Navahos have been the subject of investigations by certain members of Congress and newspapers and news agencies. A picture-story of the life of the Navahos is presented in a special exhibit to be on view in Stanley Field Hall of the Museum from December 3 to 31, inclusive, under the auspices of *Life* Magazine.

The photographs shown are selected from among hundreds taken by Mr. Leonard McCombe, who was assigned to spend many weeks in studies among this people of the Southwest—a "nation" of some 61,000 persons. The exhibit is divided into three general sections:

1. *Family Life.* The first series of panels is devoted to the Yellowsalt family, a family that lives 161 miles from the nearest white town. There are pictures of herding, butchering, baking, and other scenes of home life. Then follows a visit to the trading post where all business is transacted.

2. *Ritual.* This sequence includes the impressive puberty ceremony, which lasts five days and in which a young girl prepares for the ceremony that makes her a woman. Also included is a picture of the purification-by-sweating ceremony. The photographs in this latter sequence were made under great difficulties, the only light coming from an intensely hot wood fire in the center of the hogan.

3. *Between Two Worlds.* The young English-speaking Navahos are faced with the painful necessity of choosing between their own culture and that of the whites. The panels in this sequence are concerned with some of the problems of these transitional Americans.

Photo Exhibit Deadline Near

The Nature Camera Club of Chicago calls attention to the fact that the deadline for entries in the Fourth Chicago International Nature Photography Exhibition is January 17. The exhibition will be held in Chicago Natural History Museum from February 1 to 28, inclusive.

Distinguished Foreign Visitors

The Museum was recently visited by Mr. Richard T. M. Pescott, Director of the National Museum of Victoria, at Melbourne, Australia, and Mr. Wang Shih-Hsiang, Curator of the Department of Antiquities, at The National Palace Museum of Peiping.

The results of natural selection in wild pigeons and artificial selection in domestic varieties are shown in an exhibit in Hall 21.

THIS MONTH'S COVER

Winter in the Chicago area is perhaps best typified by the flocks of gulls and certain hardy waterfowl that appear along the lake front with the advent of severe weather. Thousands of gulls, both herring and ring-billed, congregate to scavenge near the water front from September onward. Flocks of mergansers, old-squaw and golden-eye ducks, or other northern visitors commonly form great floating rafts offshore in December and linger beyond the ice floes all winter.

A scene typical of bird life on the Chicago lake front in winter is reproduced in a habitat group in Hall 20 of the Museum, part of which is shown on the cover of this issue of the BULLETIN.

DIVING INTO UNDERSEA GARDENS OF BERMUDA CORAL REEFS

By LOREN P. WOODS
CURATOR OF FISHES

THE members of the Bermuda Deep-Sea Expedition, 1948, although devoting the greater portion of their time to fishing in mile-deep waters, had the opportunity to study and fish the shallow coral flats lying in the lagoon just north of the Bermuda Islands. In order properly to observe the spectacular reef formations and the many and varied animals living there, they used diving helmets to carry on their underwater observations. The exact relations and the degree of relationship of the Bermudian marine fauna, especially its fishes, require renewed study. Such work is now of increased importance because of the active study at the Bermuda Biological Station for Research of physiological and other experimental problems, based of necessity on Bermudian material.

GOING DOWN!
Shallow-water diving helmet being lowered on diver's shoulders as he stands on chain ladder.

Beautiful as are the islands with their cedar-covered hills, neat white-roofed cottages, and well-kept gardens, the undersea gardens of the coral reefs are even more colorful and more striking. They are long remembered by the few visitors lucky enough to view them closely—to see them by actually descending beneath the water's surface and wandering about on the white sand bottom at depths of 10 to 15 feet under the waves.

The submarine mountain on which the islands and reefs rest is composed of volcanic rock and was presumably once a volcano. It rises rather abruptly from the ocean floor. It is covered to a depth far beneath the ocean's surface by coral rock, presumably the result of slow subsidence and quite in accord with the classical Darwinian theory of coral island formation. The islands are shaped like an atoll with half of them sunk beneath the sea, so that the shallow coral reefs occupy far more of the area than does the land. On the eastern and southern parts of the atoll lies the narrow curving strip of islands one or two miles wide and fourteen miles long. The shoal coral reef and flats lying only one or two feet below the surface at low tide, separated by channels 40 to 60 feet in depth, occupy the rest of the elliptical area, about twenty-five miles long and ten miles broad. Reef corals do not grow so far north in any other part of the world; but in Bermuda, warmed by the Gulf Stream, the waters are of sufficient temperature throughout the year that a relatively few of the hardier West Indian corals grow and give shelter to typically tropical reef-living worms, shells, crabs, and fishes, as well as encrusting algae and bryozoans.

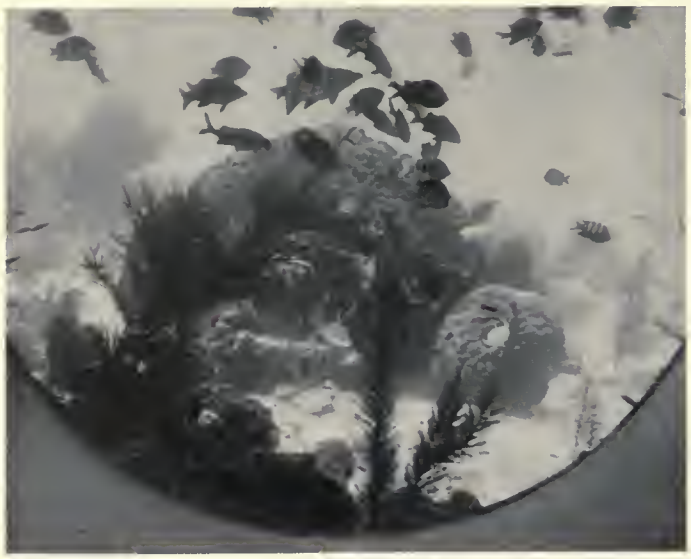
After several days of calm weather, the normal swell of the lagoon disappears and the surface of the water becomes glassy smooth. In the strong sunlight it is possible to see the flats plainly without even the aid of a glass-bottomed bucket. The reefs appear at first from above as a confused jumble of giant brain corals, staghorn corals, broad and sometimes branching sea fans and sea feathers, yellow, brown, or olive, all growing over and helping to form the rugged outlines of the banks, with their steep, crevassed sides, their arches and caves.

In order to appreciate the reef environment and examine many details in the deeper places it is necessary to don a diving helmet and climb down a swinging chain ladder to the bottom. Things appear very different to the observer when he is actually under the water with his head surrounded by the bubble of air in the diving hood. The density and buoyancy of the water make rapid movements impossible, everything takes on a murky green appearance, and visibility is limited to only 10 or 15 yards. The fishes no longer stand out clearly, and the sea fans, gorgonians, and branching corals have a fuzzy appearance. Everything is magnified, so that an 8-inch fish appears to be at least 10 or 12 inches long, and everything appears to be nearer than it actually is.

The brain corals or coral masses that from

DIVER GETS CLOSE TO NATURE UNDERSEAS
Bermuda coral reef fishes as seen at depth of about 15 feet. Underwater photograph taken by Mr. Bronson Hartley, cameraman and diver of Shelly Bay, Bermuda. Mr. Hartley's underwater photographs are made with a unique contrivance of his own invention, which adapts his camera for close-up pictures of undersea animals either in black-and-white or color.

the surface appeared to be only a few feet high now tower above the diver, who, already confined, is likely to feel even more hemmed in. Added to all this strangeness is the comparative quiet. The only sound is the intermittent swish of air being compressed into the helmet or the gurgle of hubbles escaping.



CORAL HEAD WITH ASSOCIATED FISHES

This assortment of coral and fishes, photographed through the port of a bathysphere in the Bahama area by the Field Museum-Williamson Undersea Expedition of 1929, matches the varieties found along the Bermuda reefs.

Fishes are everywhere. At first frightened by the noise and shadow of the boat, they dart into holes, hide amongst the sea fans and sea feathers, or head for deeper water between the banks. Later, after the boat has been anchored for some time, even with several swimmers splashing and diving and a helmet-diver with trailing hose invading their realm, their curiosity overcomes their fear and most of them resume their normal activities close to the boat or under it.

QUEEN ANGEL FISHES

Large queen angel fishes with their bright powdery-blue bodies and golden-yellow fins are certainly the most conspicuous as they feed lazily along the edges of the banks, turning on their sides, stopping to nibble on a slight projection or in a crevice. Down in the deeper valleys between the coral escarpments the dull-red squirrel fishes are seen to move warily in and out of their holes, always keeping close to the rocks, staying as much in the shadows as possible. These large-eyed fishes are chiefly nocturnal and, although they do move and feed during the day, they seldom wander far from their hiding places.

Schools of gray snappers, active predaceous fishes, trail in and out between the banks, paying no apparent attention to any of the small fry, which always quickly hide or press down against the growth. If, perhaps, one of these fry is injured or at a disadvantage, it is snapped up and swallowed in the most matter-of-course manner. Four or five kinds of gliding, darting, twisting "slippery dicks" and other small wrasses are everywhere. All are colorful. They conspicuously feed on the top of the banks or along its sides, approaching the diver or allowing his dip-net to come within inches before swimming away. They are seldom frightened more than momentarily, and immediately resume their busy, active lives.

The diver in his helmet or face mask has little to fear from large fishes but must keep a constant watch for long-spined black sea urchins, whose needle-sharp spines penetrate the skin readily, breaking off after carrying in a poison that is extremely painful. Fortunately, sea urchins most often settle themselves deep in a crevice, under an overhanging ledge, or in some other obscure corner, and so they are not especially bothersome. Stinging corals are out in open places, however, and easy to brush against as the uninitiated visitor wanders about watching more obvious living creatures than these anchored colonies of polyps.

Conspicuous and ever present are the yellow and black barred "sergeant majors," always quick to dart at any small floating object that looks like food, quite different in behavior from the boldly marked butterfly fishes, which usually swim in pairs and are easily frightened away by any unexpected movement. In the unbelievably dark submarine caves and under dark ledges lurk the eels known as morays, celebrated for their pugnacious tempers. They are not likely to attack unless a hand, stick, or spear is thrust at them, disturbing their day-long siesta. Also hiding under the ledges, usually near the entrance, are large spiny lobsters, with their long stiff tentacles protruding, waving and shaking, as they try to capture an unsuspecting passing fish. These and the morays are nocturnal, leaving the safety of their holes at night to forage in the shallows on the tops of the coral banks.

The reef fish fauna of Bermuda and indeed the reefs themselves are very like those of the Bahamas and of the West Indies in general. (An undersea scene of a Bahama coral reef with typical reef fishes may be seen in the Hall of Fishes, Hall O.) Larval fishes drifting on the outer edge of the Gulf Stream have been carried north every year for tens of thousands of years. A few of these, sheltered by floating sargassum weed, have been brought close enough to the Bermuda reefs to find shelter in the holes or among the branching reef growths before being gobbled up by the large cruising offshore fishes or perishing for lack of proper food. It is fairly certain that successful emigrants of many of the species are few because the Bermuda populations of these species show average differences in number of fin rays and in color when a sufficient series of specimens from Bermuda is carefully compared with a like number from their ancestral home in the West Indies. A few kinds have undergone sufficient change to be named as distinct species. Others, whose differentiation is less complete, are regarded as subspecies.

Shore-fish collections could be made by the personnel of the Bermuda Deep-Sea Expedition only during intervals of inactivity in the trawling operations, and a full season's concentrated collection of shore fishes may be indicated. It is expected that careful studies of the considerable series of various blennies, porgies, halfbeaks, and many other fishes obtained during the 1948 season's collecting will make it possible to define more clearly and more exactly the relationships of the Bermudian shore-fish fauna to that of the West Indies.

NEW MEMBERS

The following persons became Museum Members between October 13 and November 15:

Contributors

George Langford, Dr. J. Daniel Willems

Life Members

Arthur L. Myrland

Associate Members

Mrs. Alfred L. Eustice, John V. Farwell III, Mrs. Arthur S. Kahn, E. J. T. Moyer, Joseph F. Ross, H. A. Treadwell.

Sustaining Members

George L. Hunt

Annual Members

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BIRDS BATHING

By AUSTIN L. RAND
CURATOR OF BIRDS

THE toilet of most birds includes wetting their feathers in water and shaking the feathers and preening them with the bill. This bathing probably helps remove foreign matter from the birds' plumage and helps them keep it in good condition. In addition, it is probable that in summer the birds derive enjoyment from the coolness resulting from bathing. But birds bathe in cold weather as well as warm and have been recorded doing so when the temperature was only 10 or so degrees above zero.

The sparrows and robins that come about a bird bath usually hop right into the water. They squat down, fluttering their wings, and duck their heads into the water, splashing and rolling it over their backs. They may become quite drenched. Then they fly to some perch to sit and preen and dry their soaked feathers.

But some birds take shower baths. During a shower in late summer, marsh hawks can be seen sitting in the rain with wings spread, apparently enjoying the wetting the shower gives them, and a buzzard has been recorded as deliberately flying to an open perch in a rainstorm and sitting there with its wings spread, sometimes shaking its wings until the shower was over, when it flew to a sheltered place.

SPRINKLERS A BOON

The artificial showers of lawn sprinklers provide an opportunity to birds about our

Cartoon by Emily Rosenheim

gardens to take a shower bath in fine weather. A robin or a flicker may hop into the shower and squat there and indulge in bathing antics on the wet grass. Hummingbirds have been seen to fly into the dense spray of a lawn sprinkler and hover there for a moment, gradually assuming a vertical position and spreading the tail, then slowly settling to the ground, and finally "sitting" on the grass, body erect and tail spread out fanwise, the wings continuing to vibrate slowly. In a few moments the bird rises into the air and then repeats the whole performance.

In wet tropical forest it is probable that many of the tree-top birds bathe in the water that collects on the surface of the leaves, pushing their way through clusters of wet leaves and over wet surfaces of others until they are as wet as if they had actually been bathing in water. This is not restricted to tropical birds, for even in our latitudes towhees have been recorded as bathing thus, and thrushes and flickers have been seen to rub themselves over the wet grass and then go through the actions of bathing followed by preening.

BATHING WHILE FLYING

Watching swifts or swallows coursing low over the surface of a lake and occasionally touching it leaves one with the impression sometimes that the birds are perhaps bathing rather than picking up insect food or drinking. With some other birds the habit of bathing from the wing is more definite. Sometimes drongo-shrikes that are sitting up on a perch near the edge of a pool will fly out over the water, drop directly into it with a little splash, and then rise and fly back to their perch, where they either repeat the performance or sit and preen their feathers.

POST-PRANDIAL ABLUTIONS

Ospreys have been recorded as bathing while on the wing in a rather striking manner. They have been seen flying along just above the surface of the water, then descending into it, adopting a sort of vertical American eagle attitude while flapping the wings, then rising a little, flying on, and repeating the process. It has been suggested that the osprey is washing its feet in this manner after finishing its meal. One observer makes this still more definite. He says that the osprey finishes its meal of fish on a perch in a tree and then flies low over the lake. Dropping both its legs, the osprey drags them through the water, flapping its wings all the time. Then it immerses its beak and head into the water while still flying along, apparently washing off the scales and slime that it had gotten on itself while making its meal of fish.

MERRY CHRISTMAS and HAPPY NEW YEAR

The Museum will be closed both Christmas and New Year's Day so Museum employees may spend the holidays with their families. These are the only days in the year when the Museum is not open.

STAFF NOTES

Staff Taxidermist **Leon L. Pray** resigned from the staff of the Museum, effective November 19, to take a position with the Natural History Museum in Balboa Park, San Diego, California. For the present, the west-coast museum will use his services especially to reinstall disrupted zoological exhibits that were removed from the halls to facilitate use of the building as a naval hospital during the war. Mr. Pray had been a member of the Chicago Museum staff since 1907 and was the inaugurator of several new taxidermic and exhibition techniques. His Museum exhibits include habitat groups of fishes, mammals, birds, and many individual mounts or reproductions. Most of the extensive exhibits in the Hall of Fishes (Hall O) are his work, and these include several outstanding undersea scenes, most spectacular of which is the Bahama coral reef and shark group. . . .

LEON L. PRAY

Dr. Fritz Haas, Curator of Lower Invertebrates, recently was elected vice-president for 1949 of The American Malacological Union at its meeting in Pittsburgh. . . . **Mr. Karl P. Schmidt,** Chief Curator of Zoology, attended the meeting of the Society for the Study of Evolution in New York City. He presented the treasurer's annual report and made an address, "Modes of Evolution Discernible in the Classification of Snakes," at a symposium with the paleontological societies, which met jointly with the meetings of the Geological Society of America. . . . **Mr. D. Dwight Davis,** Curator of Vertebrate Anatomy, attended the same meeting, presenting an address under the title "Evolution Without Selection in the Dentition of Bears." . . . **Dr. Rainer Zangerl,** Curator of Fossil Reptiles, **Dr. Robert H. Denison,** Curator of Fossil Fishes, **Mr. Robert Kriss Wyant,** Curator of Economic Geology, and **Mr. Bryan Patterson,** Curator of Fossil Mammals, attended the meetings of the Geological Society of America in New York City last month. . . . **Dr. Paul S. Martin,** Chief Curator of Anthropology, and **Mr. Donald Collier,** Curator of South American Ethnology and Archaeology, will leave for Mexico City late in December to inspect archaeological material offered for possible exchange by the National Museum of Mexico. Expenses of the project, which will require three to five weeks, have been generously contributed by the Viking Fund of New York City. Mexican representatives have already inspected material here.

RHODODENDRONS, AZALEAS —PLANT ARISTOCRATS

By JULIAN A. STEYERMARK
ASSOCIATE CURATOR OF THE HERBARIUM

Although comparisons of interesting and beautiful objects or scenes are always futile, it is obvious that some things attract more attention than others by their sheer beauty. Such are the rhododendrons and azaleas, among the most beautiful shrubs known to man. Getting its name from the Greek *rhodon*, rose, and *dendron*, tree, rhododendron was the ancient Greek designation for oleander (*Nerium Oleander*).

When seen growing under the best conditions, rhododendrons and azaleas in full bloom present an unforgettable sight. Displaying practically all shades of color, except blue and green, the flowers covering the branches are generally of an open bell-shaped or funnel-form type with or without a slender tube, bearing from five to ten lobes. The flowers may be fragrant or lack any perceptible odor.

People often regard rhododendrons and azaleas as two distinct types of plants. Actually, both belong to one and the same genus, *Rhododendron*. For the sake of convenience, horticulturists call the ones with evergreen leaves rhododendron and those with deciduous leaves azalea. The genus consists of more than 400 different species scattered over the cooler temperate portions of the northern hemisphere in both the Old and New World. Although not occurring in the New World south of the United States, many Old World species are found in the high mountains of southern Asia and the Malay Archipelago and extend southward into New Guinea, Australia, and the Philippine Islands. The greatest diversity of species is encountered in China and the Himalaya region. About 26 species are known in the United States and Canada.

SURVIVORS OF ICE AGE

The geographical distribution of the genus is highly interesting. It aids in shedding light on the relationships of the flora of the eastern United States with that of eastern Asia, the two main centers of distribution, where the greatest number of species is found. Other genera, such as the tulip tree (*Liriodendron*), witch hazel (*Hamamelis*), skunk cabbage (*Symplocarpos*), ginseng (*Panax*), golden seal (*Hydrastis*), sassafras (*Sassafras*), strawberry shrub (*Calycanthus*), mayapple (*Podophyllum*), yellow wood (*Cladrastis*), and twin-leaf (*Jeffersonia*), are represented by one or more species in eastern North America and by others in eastern Asia, or in a few cases, as in *Magnolia*, are also found far southward into Central and South America. They have been considered by botanists as survivors of an earlier geological period when Asia and North America were connected in some way, permitting free migration and intermingling between the floras. As these continents became separated, the areas held by such genera were likewise divided.

Prior to the Ice Age, parts of the United States were being subjected to continental flooding and mountain making. Large areas of desert and plain topography became features of the western United States. Subsequently, as the ice sheets covered large areas of North America and Europe, many habitats were destroyed and new climates replaced those previously existing. New types of plant life followed the glaciers and replaced the former occupants of the areas

A TYPICAL AZALEA

Close-up of one of the Azaleas found in Great Smoky Mountains National Park. It shows the general features of flowers of this type.

invaded. The outcome is that such plants, as mentioned above, survived in eastern North America and in eastern Asia, but were mostly exterminated in Europe and the western United States. Today in the eastern United States many of these surviving genera are found in the southern Appalachian and Piedmont area and also westward into the Ozark plateau, where they have escaped the vicissitudes of glaciation and other events that have befallen their less fortunate relatives elsewhere. Nevertheless some of the species of rhododendron managed to survive even in parts of the northwestern United States (*R. californicum*) and central Europe (*R. ferrugineum*), but the great mass of the genus is now centered in eastern Asia and, to a lesser extent, in the eastern United States.

TROPICAL RELATIVES

In the mountains of Mexico, Central and South America, especially in the Andes of Venezuela to Peru, rhododendrons and azaleas are replaced by very showy shrubs with white, pink, rose, or red flowers belonging to the genus *Befaria*. One species of this genus is found in the southeastern United States. Befarias are often referred to as the rhododendrons of the tropics. Although members of the same heath family (Ericaceae), the two genera are only distantly related.

Although most rhododendron plants are small shrubs with a bushy growth, a few reach tree-like proportions, which range, in the case of some of the Himalayan species like *R. barbatum* and *R. grande*, from 30 to 60 feet in height.

Many people become acquainted with rhododendrons and azaleas through flower shows or florists' displays or on tours through the southern, eastern, or northwestern states. Many of the displays seen on such occasions feature well-rounded symmetrical bushes thickly covered with masses of bright-colored blossoms ranging in hues of magenta, deep rose, orange, scarlet to white. The leaves of these varieties are usually small and semi-evergreen or evergreen. These horticultural types generally are referred to the so-called Indian azalea and are usually of Japanese origin, belonging to *R. indicum* or varieties of *R. obtusum*, or to hybrids of these species with other Asiatic types. In addition to these our native North American species of rhododendron and azalea from the eastern half of the United States are commonly cultivated throughout the southern, eastern, and northwestern states and may be purchased from local nurserymen.

MAGNIFICENT NATURAL STANDS

Visitors to the native haunts of the American species at the height of their flowering season are rewarded with an unforgettable experience. Here in the southern Appalachians and Piedmont plateau numerous species thrive in the relatively mild and moist environment and vie with each other for rich color effects. Fortunately large natural stands of azaleas and rhododendrons are preserved in various state and national forests, national parks, and private estates of the Atlantic coastal states. Particularly conspicuous and well represented are these plants in the Great Smoky Mountains National Park of Tennessee and North Carolina. From the middle to the end of June thousands of visitors come from all parts of the United States to enjoy the magnificent sight of these beautiful shrubs while in flower.

The large sprangly shrubs of two species with beautiful dark leathery evergreen leaves, the rose bay or great laurel (*R. maximum*) and mountain rose bay or purple laurel (*R. catawbiense*), cover thousands of acres in this park and adjacent region, forming almost impenetrable thickets on some of the mountain slopes. Another one of the evergreen species, with smaller leaves, often brown beneath, and with dense clusters of smaller rose-purple flowers is *R. carolinianum*. This occurs on the higher slopes and summits of these mountains and the Blue Ridge, from South Carolina to North Carolina. These evergreen rhododendrons should not be confused with mountain

laurel, which also has evergreen leaves but belongs to the genus Kalmia. The laurel festivals held in the southern Appalachian region celebrate the time of year in June when both the evergreen rhododendron and kalmia are in bloom.

Azaleas, with their deciduous leaves, reach their finest display on the so-called grassy "balds" of the Great Smoky Mountains National Park. These balds are found either on some of the mountain slopes or on certain crests or tops of ridges, which are mostly open and devoid of trees. Some of the finest displays of flower abundance and color can be seen in such sunny spots. Here only a few species intermingle, but the number of plants is so great that many shades of color are exhibited. Particularly striking is the brilliant variety of orange, yellow, crimson, or red masses afforded by the flame azalea (*R. calendulaceum*). Hues of pink, rose, white, and various combinations of these colors are contributed by the other species of azalea present.

DIFFICULT TO CULTIVATE

Although rhododendrons and azaleas are favorite plants of many flower-lovers, they are among the most difficult to grow and respond only if given soil and climatic conditions favorable to their development. They are comparatively easy to grow in the southern states where the climate is less rigorous, but in the northern states they are grown with difficulty, and some of the tender Asiatic species cannot be grown outdoors the year around. In the North the evergreen species often suffer from windburn in the winter and drought in the summer.

Despite the difficulties mentioned, many flower enthusiasts of the northern and central states cannot refrain from trying to grow these plants, giving them special acid soil and protection from winter winds. In the southern and New England states, as well as in the milder moist parts of the Northwest in Oregon, Washington, and northern California, rhododendrons and azaleas can be grown under optimum conditions, and it is here that the bulk of the species may be seen to great advantage. But to see them in their natural beauty in this country, one should journey eastward to the Great Smoky Mountains. There in June colorful vistas, unlike others seen before, will fill the eye.

Plastics in Taxidermy

Many years before modern plastics achieved the prominent place they now hold in fabrication of countless industrial products, the Department of Zoology of the Museum was employing them for the preparation of lifelike exhibits of certain kinds of animals and parts of animals, the original specimens of which are not susceptible to satisfactory preservation by usual methods of taxidermy. The use of these materials, originated and developed by Leon L. Walters of the Museum staff, has since been adopted by many other museums.

Books

Museum publications are available at the North Entrance of the Museum. Mail orders will be filled promptly if accompanied by remittance, including postage (in this instance 4 cents domestic; 6 cents foreign).

PREHISTORIC MEN. By Robert J. Braidwood. Chicago Natural History Museum, Popular Series, Anthropology, Number 37, 1948. 117 pages, 38 drawings by Susan T. Richert. Price 50 cents.

Prehistory, as encountered in reports written for the profession, is a formidable subject that seems to consist of unpronounceable names for unfamiliar objects, places, and periods. Yet this need not be so, as demonstrated by Dr. Braidwood's simply written small book. The story of man's earliest cultural beginnings is a fascinating one, and it is remarkable how much has been learned of those dim millennia when men first began to invent tools, to experiment in the arts, and to evolve new ways of life.

Braidwood's *Prehistoric Men* is a clear, condensed account of the period prior to about 3000 B.C. This date marks approximately the beginning of writing in the Near East and the opening of the historic period. What falls before this date is prehistory, the time before written history began. As Braidwood points out, more than 99 per cent of man's story is actually prehistory. *Prehistoric Men* therefore covers a lot of ground.

Commencing with the early part of the Ice Age, the book carries the reader through the thousands of years of the Paleolithic, or Old Stone Age, and in simple language delineates the main trends in the culture growth of those early times. The finds of this period are at present undergoing reinterpretation, and this little book actually contains one of the clearest syntheses in the literature. After the Paleolithic, Braidwood describes the Neolithic, or New Stone Age. These stone-age designations are holdovers from early writers and continue to be used mostly for convenience, for the important events of the Neolithic were not in connection with stone but rather with the domestication of plants and animals. With the domestication of cattle, sheep, and goats, and the cultivation of grains, there followed a revolution in man's way of life fully as important as the industrial revolution of more recent times. Food-producing, as against food-collecting alone, first began in the Near East about 8000–6000 B.C. It occurred in the New World independently, probably sometime during the first millennium B.C., and may possibly have happened separately in China about 3000 B.C. The Near Eastern occurrence is the first of these and paved the way for the civilizations of Egypt and Mesopotamia.

Prehistoric Men is attractively illustrated with a large number of drawings, many of them in two colors. The book is recommended particularly to Museum visitors intending to see Hall C, the Hall of the Stone Age of the Old World.

ALEXANDER SPOEHR
Curator, Oceanic Ethnology

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: Joseph N. Field, Lake Forest, Ill.—2 beaded yokes and 2 pairs of beaded cuffs, for women's costumes, Greenland.

Department of Botany:

From: Dr. Hugh C. Cutler, Chicago—10 cryptogams and 50 specimens of grasses, Texas, Bolivia, and Mexico; Dr. Chester S. Nielsen, Tallahassee, Fla.—192 specimens of algae, northern Florida; Dr. Eula Whitehouse, Dallas, Tex.—60 specimens of algae, Texas; Dr. J. L. Blum, Buffalo, N. Y.—74 specimens of algae, Pennsylvania; Dr. Francis Drouet, Chicago—275 miscellaneous cryptogams, Pennsylvania, Delaware, and Maryland; Dr. L. J. Gier, Liberty, Mo.—52 specimens of algae, Missouri; Dr. Rafael Romero Castañeda, Bogotá, Colombia—77 herbarium specimens, Colombia.

Department of Geology:

From: T. C. Phillips, Tippecanoe, Ind.—a specimen of *Stegmaria ficoides*, Indiana; Eugene S. Richardson, Jr., Winnetka, Ill.—cast of a Middle Cambrian trilobite, British Columbia; Standard Oil Co., New York—10 panels 30 x 40 inches, telling the story of oil.

Department of Zoology:

From: Dr. Walter Biese, Santiago, Chile—306 specimens in 13 lots of fresh-water mollusks, comprising 10 of paratypes, Chile; Chicago Zoological Society, Brookfield, Ill.—adult female gorilla; Robert Burton, Chicago—2 ivory-billed woodpeckers, mounted, Arkansas; Robert H. Hagey, Chicago—a red fox skeleton, Illinois; Jerry Cordell, Savannah, Ga.—a legless lizard, Georgia; Dr. Alfred E. Emerson, Chicago—a lizard and 7 snakes, Belgian Congo.

Library:

From Dr. Henry Field, Washington, D.C.; Col. Clifford C. Gregg, Valparaiso, Ind.; Eugene S. Richardson, Jr., Winnetka, Ill.; Rupert L. Wenzel, Oak Park, Ill.; Dr. Cesar Vargas C., Cuzco, Peru; and Mrs. Henry Nelson Tuttle, New Haven, Conn.

FIFTY YEARS AGO AT THE MUSEUM

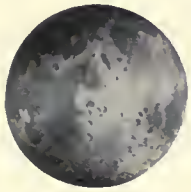
In recognition of the keen interest of many persons in the early history of the Museum, the BULLETIN herewith inaugurates a column, "Fifty Years Ago at the Museum." The research into past records for significant events as well as the reporting of them is being done by Miss Margaret J. Bauer, of the Department of Zoology.

"The Library at present contains 9,003 books and 9,630 pamphlets . . ."

[On last count, in 1948, our rapidly growing library has reached 130,000 volumes.]

* * *

"In Geology, the gift of Mr. L. W. Reese, of Chicago, of the Schmidt-Dickert relief model of the moon is a notable acquisition. This great model, 19 feet in diameter, . . . was prepared with great care from the charts of Beer and Madler and of Dr. Schmidt of the Athens Observatory, undoubtedly the greatest authority upon the topography of the moon. . . ."



MOON MODEL

[The exhibit may now be found in Clarence Buckingham Hall—Hall 35.]

* * *

"Mr. George A. Dorsey, Curator of the Department of Anthropology, accompanied by Mr. F. B. Melville, visited the province of Tysayan, Arizona, in December and January. The object of the expedition was to make casts of a number of Hopi Indians."

* * *

"Notwithstanding his three months' absence on expeditions in the Northwest, Mr. Carl E. Akeley, the Chief Taxidermist, has created two more striking groups from the material obtained on the African expedition—Waller's Gazelles and the oryx group. The same appreciation of the high purpose of his work, the same skillful blending of nature and of art, the same conspicuous care in detail, distinguish these groups as marked the other creations of which he has been the author."

* * *

"Mr. Daniel Giraud Elliot, the Curator of the Department of Zoology, and his assistant, Mr. C. E. Akeley, were commissioned upon an expedition to the Northwest in July. . . . Mr. Elliot writes: 'The expedition to the Olympian Mountains . . . has thus far secured 500 skins of deer, carnivora, and rodents. . . . This collection is exceedingly valuable, coming as it does from hitherto unknown localities where no naturalist has ever penetrated. There are probably species new to science. . .'"

MT. KENYA BIRDS

The Museum has just received a small but important collection of birds from Mt. Kenya in Africa. It is the gift of Mr. Walther Buchen of Chicago.

Mt. Kenya stands nearly on the equator but rises to more than 17,000 feet, so high that snow falls on its summit and there is glacial ice there. Its interest lies in its being an isolated mountain and also one where, compressed into an altitude of 17,000 feet, a climatic transition from tropics to eternal snow can be studied.

To the ornithologist, Mt. Kenya is interesting from both points of view. Mr. Buchen's collection contains samples of some of the brilliant, metallic sunbirds that in East Africa are found only high up on the various mountains. Also included are specimens of the hadada ibis, a rare sparrow hawk, a francolin restricted to Mt. Kenya, a snipe, the strange plantain eaters (relatives of our cuckoos), tiny barbets, paradise flycatchers, mountain thrushes, an ox-pecker that climbs over cattle as a woodpecker over a tree, and weaver birds noted for their long flowing tails or their seasonal plumage change from a brilliant breeding to a dull off-season plumage. One of the most interesting species is a dull, streaked seed-eater, a kind of sparrow; as one goes up the mountain the birds encountered are progressively different in color, presumably a response to the change in environment. As further work is done on the collection, probably other interesting discoveries will be made.

—A.L.R.

DECEMBER LECTURE TOURS, DAILY EXCEPT SUNDAYS

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given covering all departments. Special subjects are offered on Wednesdays and Fridays (the Friday tours open with an introductory lecture and slides or films in the Meeting Room on the second floor of the Museum); a schedule of these follows:

Wed., Dec. 1—How Animals Spend the Winter (*Jane Sharpe*).

Fri., Dec. 3—Fibers, Feathers, and Furs—Materials Used in Clothing. Illustrated introduction in Meeting Room (*Marie Svoboda*).

Wed., Dec. 8—The Largest and Smallest Animals (*Lorain Farmer*).

Fri., Dec. 10—Trees in Winter. Illustrated introduction in Meeting Room (*Miriam Wood*).

Wed., Dec. 15—Gift Customs—When and Why People Give Presents (*Harriet Smith*).

Fri., Dec. 17—Sacred Animals. Illustrated introduction in Meeting Room (*Jane Sharpe*).

Wed., Dec. 22—Christmas Greens—Mistletoe, Holly, and Evergreens (*Marie Svoboda*).

Fri., Dec. 24—Adventures of a Fossil Hunter. Illustrated introduction in Meeting Room (*Lorain Farmer*).

Wed., Dec. 29—Indian Art in the Americas (*June Buchwald*).

Fri., Dec. 31—New Year's Celebrations. Illustrated introduction in Meeting Room (*Harriet Smith*).

CHRISTMAS SHOPPING NEED BE NO BURDEN—

Christmas shopping and preparing of many packages can be eased by using services Chicago Natural History Museum offers:

(1) Christmas Gift Memberships

Send to the Director the name and address of the person to whom you wish to give a Museum membership, together with your remittance to cover membership fee or dues.

An attractive Christmas card notifying the recipient that through your generosity he has been elected a Member of the Museum will be sent, together with membership card or certificate and information on membership privileges.

(2) Museum Book Shop Gifts

The BOOK SHOP has books endorsed for scientific authenticity by members of the Museum staff, for both adults and children.

Where desired, the BOOK SHOP will handle mail and telephone (WAbash 2-9410) orders and will undertake all details of wrapping and dispatching gift purchases to the designated recipients, together with such personal greetings as the purchaser may specifiy.

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